

# TRAINING & PERSONNEL SYSTEMS TECHNOLOGY

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## R&D PROGRAM DESCRIPTION

FY 90/91 AMENDED UNCLASSIFIED/UNLIMITED

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DEFENSE LOGISTICS AGENCY  
DEFENSE TECHNICAL INFORMATION CENTER  
CAMERON STATION  
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Research and Development (R&D)

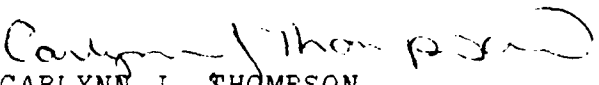
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1. The Training and Personnel Systems Technology (TPST) R&D Program Description is a product of the Defense Technical Information Center, Manpower and Training Research Information System (MATRIS), San Diego, CA. Data are based on amended FY 90-91 Congressional Descriptive Summaries provided by the Services and the Office of the Deputy Director, Defense Research and Engineering (Research and Advanced Technology).

2. The Program Description is a reference document that describes R&D technology categories including: (1) manpower and personnel, (2) education and training, (3) simulation and training devices, and (4) logistics and human factors. The contents present narrative and fiscal data available from the biennial FY 90-91 program and budget as of Feb 90. MATRIS maintains a related online database that is updated as later fiscal information becomes available.

3. This reference document is produced and distributed annually as an aggregation and summary of TPST R&D. Its overview and fiscal summary are intended to encourage and enhance R&D coordination.

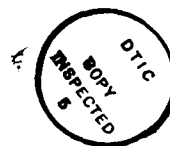
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MATRIS Program Manager

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NOTICE

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These pages amend the FY90-91 edition  
of the  
Training and Personnel Systems Technology  
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This program description is a product of the  
Manpower and Training Research Information System (MATRIS).  
For additional information, contact the MATRIS office:  
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## I. INTRODUCTION

-----

This reference document presents a comprehensive overview of the Training and Personnel Systems (TPST) Technology area, which includes (1) Manpower and Personnel (2) Education and Training (3) Simulation and Training Devices and (4) Human Factors for FY90 and FY91, summarizing the R&D Program, Basic Research through to Development (6.1-6.4). It consolidates Program Element and Project information and serves as a management tool for laboratory managers and planners and headquarters personnel in the Services and OSD.

This document integrates summaries of the work being conducted by the laboratories and associated funding in the form of narratives, tables, and listings. Comprehensive in nature and using a variety of formats, it allows the user to view, extract, and aggregate vital information for decision-making and resource commitment.

This document contains:

Fiscal tables and graphs (Section II)

This section encompasses a series of cross-tabulations featuring FY90 and FY91 funding figures by Congressional Categories, DoD Organizations, and Budget Categories.

Graphic formats display data for:

- (A) A comparison of estimated vs. actual total TPST R&D funding for President's Budget 1984-1990.
- (B) Breakdowns of total TPST Program funding by Budget Category, and Service for FY90 and FY91.

Program Element and Project synopses (Section III)

This section presents synopses of each Program Element and its associated projects, sorted by DoD organization, including the products and payoffs of that work.

Overall synopses and Project listings (Section IV)

This section summarizes the work being conducted by each Service within each Congressional Category. Listings specify the Projects that fall within each Congressional Category for each Service.

Appendices (Section V)

This section contains: (a) a list of the Congressional Categories and sub-Categories, (b) a list of the Projects completed in FY90, (c) a list of the Projects to be initiated in FY91, and (d) a selection of policy-level memoranda that impact the TPST program.

### How to Use This Book

This document can be used in a variety of ways, depending upon the reader's needs. This discussion about how the book can be used is not intended to be comprehensive, but rather suggestive, through the use of several examples.

Let us look at how a reader might approach several different areas of interest using this TPST Program Description.

#### 1. Work being done in the area of Simulation and Training

One can begin with a brief overview of the area by turning to Section IV-A, and to seeing what each of the Services is doing in the area. A reader less familiar with the TPST Program can read the brief narrative associated with that Congressional Category for each Service. The pages following each narrative contain listings of all the Projects under which work in Simulation and Training is being carried out. The Projects are sorted by Program Element.

It might also pay to glance at Appendix A, which contains a brief list of the Congressional Categories and subcategories.

Having gotten an overview, one can turn to several sections. Using the lists of relevant Program Elements and Projects for each Service, the reader can flip to Section III-A, B, C, D (Army, Navy, and Air Force, DLA) and scan the appropriate Program Element and, particularly, Project synopses to get a more detailed view of the objectives, plans, payoffs, and accomplishments of the work being carried out in the area. Within each Service subsection, the synopses are in order of Program Element, and within that by Project.

Finally one can turn to the funding cross-tabulations in Section II, to gain a better analytic understanding of funding apportionment. Tables in subsections 2, 3, 4 offer detailed information about how funding for Simulation and Training is allocated by Service, Budget Category, or by Program Element. This way one can gain a feel of the relative weight (in terms of funding) being assigned to various areas.

2. How do the Services' funding compare in FY90 and FY91?

The fiscal tables in Section II are most directly relevant for this. Tables in subsection II-1 provide a quick overview, breaking down the Services' funding by Budget Category and by Congressional Category for FY90 and FY91, respectively. Thus, one can compare the Services' funding with each other and determine where the emphases lie for each Service and the overall TPST program. The top and bottom charts on the two pages compare the funding for the two fiscal years.

Page III-ii in the beginning of Section III shows actual for FY88 & FY89, adjusted for FY90 and requested funding for FY91 for each Program Element, sorted and totaled by Service.

Further detail in these categories and others can also be gained by turning to the tables in subsections II-4 and -5 (Budget Category by Congressional Category cross-tabulations, overall (4) and by Service (5) for FY90 and FY91).

3. What new research Projects will begin in FY91?

Turn to Appendix C. For greater detail, turn to the relevant synopses in Section II.

4. Which Projects will be completed in FY90?

Turn to Appendix B. For greater detail, turn to the relevant synopses in Section II.

5. What work is planned in FY90 in TPST Basic Research?

Basic research is Budget Category 6.1. Plans for research in FY90 and FY91 are contained in the narrative section (Section III) in the "Synopsis" portion of each Program Element and Project. Because the first two digits of each Program Element reflect the Budget Category it is in, and the Program Elements are in Program Element order, the 6.1 Program Elements and Projects can be easily located at the beginning of the narrative section for each Service.

6. What was accomplished in FY89 in Navy Human Factors work?

The past year's (FY89) accomplishments for each effort are located in the "Payoff/Utilization" portion of each Program Element and Project narrative in Section III. There are two ways of locating the Navy Human Factors efforts.

First, one could simply flip through the pages of subsection III-B (Navy narratives) and stop at each effort for which the Congressional Category is listed as "Human Factors".

Alternatively, as in Question 1 above, turn to subsection IV-A-5 and obtain the lists of Navy Human Factors Program Elements and Projects and then turn directly to the relevant narratives in subsection III-B.

#### Further Information

This document has been prepared by the Defense Technical Information Center, Manpower and Training Research Information System (MATRIS) Office, in San Diego. It is based on current Program Element and Project records in the MATRIS database, updated with the amended FY90/91 President's Budget submission.

The MATRIS database covers the TPST R&D Program at the Program Element, Project, and Work Unit levels. Further information about the TPST Program at any of these levels can be obtained by contacting:

MATRIS User Services  
Defense Technical Information Center, DTIC-DMA  
San Diego, CA 92152-6800

Phone: (619) 553-7000

Autovon 553-7000

#### SUGGESTIONS and COMMENTS

This document offers an overview of the TPST Program based on the latest annual President's Budget. It is intended to be informative and to provide a wide variety of information.

MATRIS, as the agency responsible for the production of this document, welcomes any suggestions for improving either the content, the presentation, or the timeliness of the TPST Program Description. If you have any suggestions or criticism which could help in improving the document, we would like to hear from you. This page of the Program Description has been included for your comments.

Please mail your comments and suggestions to:

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MATRIS Office, San Diego  
San Diego, CA 92152-6800  
FAX (619) 553-7053 AV553-7053

## II. FISCAL TABLES

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TABLE II- 6 Congressional Categories by DoD Organization for Budget Categories 6.1 and 6.2	II- 6-1
TABLE II- 7 Congressional Categories by DoD Organization for Budget Categories 6.1, 6.2, and 6.3	II- 7-1
NOTE:	
The percentages shown in each table may not total correctly due to rounding.	

# LIST OF ABBREVIATIONS USED IN FISCAL TABLES

Variable Name	Abbreviation	Used For
CONGRESSIONAL CATEGORY	ET	Education and Training
	HF	Human Factors
	MP	Manpower and Personnel
	ST	Simulation and Training Devices
BUDGET CATEGORY	6.1	Basic Research
	6.2	Exploratory Development
	6.3	Advanced Development
	6.4	Engineering Development
DoD ORGANIZATION	ARMY	Army
	NAVY	Navy and Marine Corps
	AF	Air Force
	DLA	Defense Logistics Agency



TABLE II-1

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET  
 BUDGET CATEGORY BY DOD ORGANIZATION  
 1990 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY				TOTAL
	6.1	6.2	6.3	6.4	
	-----	-----	-----	-----	-----
ARMY	6.60	36.39	22.35	26.74	92.08
(ROW%)	( 7)	( 40)	( 24)	( 29)	(100)
NAVY	12.53	13.25	15.67	18.21	59.66
(ROW%)	( 21)	( 22)	( 26)	( 31)	(100)
AF	8.76	40.15	22.15	62.58	133.65
(ROW%)	( 7)	( 30)	( 17)	( 47)	(100)
DLA	0.00	0.00	0.00	5.00	5.00
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
	-----	-----	-----	-----	-----
TOTAL	27.89	89.79	60.17	112.53	290.39
(ROW%)	( 10)	( 31)	( 21)	( 39)	(100)

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET  
 BUDGET CATEGORY BY DOD ORGANIZATION  
 1991 (\$MILLIONS)

DOD ORGANIZATION	BUDGET CATEGORY				TOTAL
	6.1	6.2	6.3	6.4	
	-----	-----	-----	-----	-----
ARMY	6.30	36.97	22.86	56.11	122.25
(ROW%)	( 5)	( 30)	( 19)	( 46)	(100)
NAVY	13.50	15.15	20.22	13.43	62.30
(ROW%)	( 22)	( 24)	( 32)	( 22)	(100)
AF	9.29	42.52	25.26	44.72	121.79
(ROW%)	( 8)	( 35)	( 21)	( 37)	(100)
DLA	0.00	0.00	0.00	9.69	9.69
(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
	-----	-----	-----	-----	-----
TOTAL	29.09	94.64	68.34	123.95	316.03
(ROW%)	( 9)	( 30)	( 22)	( 39)	(100)

TABLE II-2

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1990 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY	8.06	30.10	11.26	42.65	92.07
(ROW%)	( 9)	( 33)	( 12)	( 46)	(100)
NAVY	14.28	10.31	14.41	20.65	59.65
(ROW%)	( 24)	( 17)	( 24)	( 35)	(100)
AF	56.19	40.99	11.52	24.94	133.63
(ROW%)	( 42)	( 31)	( 9)	( 19)	(100)
DLA	5.00	0.00	0.00	0.00	5.00
(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
TOTAL	83.52	81.39	37.19	88.24	290.35
(ROW%)	( 29)	( 28)	( 13)	( 30)	(100)

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION

1991 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY	7.67	31.04	10.68	72.85	122.24
(ROW%)	( 6)	( 25)	( 9)	( 60)	(100)
NAVY	16.65	11.81	14.10	19.73	62.29
(ROW%)	( 27)	( 19)	( 23)	( 32)	(100)
AF	46.92	44.40	11.20	19.25	121.77
(ROW%)	( 39)	( 36)	( 9)	( 16)	(100)
DLA	9.69	0.00	0.00	0.00	9.69
(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
TOTAL	80.93	87.25	35.98	111.83	315.99
(ROW%)	( 26)	( 28)	( 11)	( 35)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

1990 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
	PROGRAM ELEMENT	ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
ARMY						
	61102A	0.69	4.03	0.79	1.11	6.61
	(ROW%)	( 10)	( 61)	( 12)	( 17)	(100)
	62716A	0.00	15.00	0.00	0.00	15.00
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
	62727A	0.00	0.00	0.00	4.41	4.41
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
	62785A	3.24	5.24	4.17	4.33	16.98
	(ROW%)	( 19)	( 31)	( 25)	( 26)	(100)
	63003A	0.00	0.00	0.00	3.95	3.95
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
	63007A	4.15	5.84	6.30	2.12	18.40
	(ROW%)	( 23)	( 32)	( 34)	( 11)	(100)
	64715A	0.00	0.00	0.00	16.13	16.13
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
	64801A	0.00	0.00	0.00	10.62	10.62
	(ROW%)	( 0)	( 0)	( 0)	(100)	(100)
ARMY TOTAL						
	(ROW%)	8.07	30.11	11.26	42.66	92.09
		( 9)	( 33)	( 12)	( 46)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1990  
BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1990 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
NAVY						
61153N		6.90	2.64	3.01	0.00	12.53
(ROW%)		( 55)	( 21)	( 24)	( 0)	(100)
62131M		0.00	0.00	0.53	0.00	0.53
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
62233N		2.16	0.82	2.89	2.47	8.34
(ROW%)		( 26)	( 10)	( 35)	( 30)	(100)
62234N		0.00	4.39	0.00	0.00	4.39
(ROW%)		( 0)	(100)	( 0)	( 0)	(100)
63701N		0.00	2.47	0.00	0.00	2.47
(ROW%)		( 0)	(100)	( 0)	( 0)	(100)
63707N		0.00	0.00	3.03	0.00	3.03
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
63720N		5.22	0.00	0.00	0.00	5.22
(ROW%)		(100)	( 0)	( 0)	( 0)	(100)
63732M		0.00	0.00	3.97	0.00	3.97
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
63733N		0.00	0.00	0.00	0.97	0.97
(ROW%)		( 0)	( 0)	( 0)	(100)	(100)
64703N		0.00	0.00	0.99	0.00	0.99
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
64715N		0.00	0.00	0.00	17.21	17.21
(ROW%)		( 0)	( 0)	( 0)	(100)	(100)
NAVY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	14.28	10.32	14.42	20.66	59.66
		( 24)	( 17)	( 24)	( 35)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

1990 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				
	PROGRAM ELEMENT	ET	HF	MP	ST	TOTAL
		-----	-----	-----	-----	-----
AF						
	62202F	0.00	20.75	0.00	0.00	20.75
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
	62205F	13.59	5.52	6.16	2.90	28.17
	(ROW%)	( 48)	( 20)	( 22)	( 10)	(100)
	63106F	0.00	9.12	0.00	0.00	9.12
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
	63227F	2.38	0.00	1.05	3.99	7.42
	(ROW%)	( 32)	( 0)	( 14)	( 54)	(100)
	63231F	0.00	5.61	0.00	0.00	5.61
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
	64227F	39.74	0.00	0.40	18.05	58.19
	(ROW%)	( 68)	( 0)	( 1)	( 31)	(100)
	64243F	0.48	0.00	3.91	0.00	4.39
	(ROW%)	( 11)	( 0)	( 89)	( 0)	(100)
		-----	-----	-----	-----	-----
AF	TOTAL	56.20	41.00	11.53	24.95	133.65
	(ROW%)	( 42)	( 31)	( 9)	( 19)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1990 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
DLA		-----	-----	-----	-----	-----
64722S		5.01	0.00	0.00	0.00	5.01
	(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
DLA	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	5.01	0.00	0.00	0.00	5.01
		(100)	( 0)	( 0)	( 0)	(100)
DOD TOTAL		-----	-----	-----	-----	-----
	(ROW%)	83.54	81.41	37.20	88.26	290.39
		( 29)	( 28)	( 13)	( 30)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)			
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY			
		ET	HF	MP	ST
		-----	-----	-----	-----
ARMY					
61102A		0.65	3.86	0.75	1.06
	(ROW%)	( 10)	( 61)	( 12)	( 17)
62716A		0.00	15.32	0.00	0.00
	(ROW%)	( 0)	(100)	( 0)	( 0)
62727A		0.00	0.00	0.00	4.52
	(ROW%)	( 0)	( 0)	( 0)	(100)
62785A		3.22	5.30	4.13	4.47
	(ROW%)	( 19)	( 31)	( 24)	( 26)
63003A		0.00	0.00	0.00	3.87
	(ROW%)	( 0)	( 0)	( 0)	(100)
63007A		3.80	6.57	5.80	2.82
	(ROW%)	( 20)	( 35)	( 31)	( 15)
64715A		0.00	0.00	0.00	41.85
	(ROW%)	( 0)	( 0)	( 0)	(100)
64801A		0.00	0.00	0.00	14.26
	(ROW%)	( 0)	( 0)	( 0)	(100)
ARMY TOTAL					
	(ROW%)	7.67	31.05	10.69	72.86
		( 6)	( 25)	( 9)	( 60)
					122.25
					(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
NAVY						
61153N		7.43	2.84	3.25	0.00	13.51
(ROW%)		( 55)	( 21)	( 24)	( 0)	(100)
62131M		0.00	0.00	0.55	0.00	0.55
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
62233N		3.25	1.87	2.93	2.33	10.38
(ROW%)		( 31)	( 18)	( 28)	( 22)	(100)
62234N		0.00	4.22	0.00	0.00	4.22
(ROW%)		( 0)	(100)	( 0)	( 0)	(100)
63701N		0.00	2.88	0.00	0.00	2.88
(ROW%)		( 0)	(100)	( 0)	( 0)	(100)
63707N		0.00	0.00	3.20	0.00	3.20
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
63720N		5.98	0.00	0.00	0.00	5.98
(ROW%)		(100)	( 0)	( 0)	( 0)	(100)
63732M		0.00	0.00	3.11	0.00	3.11
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
63733N		0.00	0.00	0.00	5.04	5.04
(ROW%)		( 0)	( 0)	( 0)	(100)	(100)
64703N		0.00	0.00	1.07	0.00	1.07
(ROW%)		( 0)	( 0)	(100)	( 0)	(100)
64715N		0.00	0.00	0.00	12.36	12.36
(ROW%)		( 0)	( 0)	( 0)	(100)	(100)
NAVY	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	16.66	11.82	14.11	19.74	62.31
		( 27)	( 19)	( 23)	( 32)	(100)



TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
AF						
62202F		0.00	21.30	0.00	0.00	21.30
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
62205F		14.42	6.05	6.64	3.40	30.51
	(ROW%)	( 47)	( 20)	( 22)	( 11)	(100)
63106F		0.00	11.76	0.00	0.00	11.76
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
63227F		2.39	0.00	1.38	4.43	8.20
	(ROW%)	( 29)	( 0)	( 17)	( 54)	(100)
63231F		0.00	5.30	0.00	0.00	5.30
	(ROW%)	( 0)	(100)	( 0)	( 0)	(100)
64227F		29.40	0.00	0.40	11.42	41.22
	(ROW%)	( 71)	( 0)	( 1)	( 28)	(100)
64243F		0.72	0.00	2.78	0.00	3.50
	(ROW%)	( 21)	( 0)	( 79)	( 0)	(100)
AF	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	46.93	44.41	11.21	19.26	121.79
		( 39)	( 36)	( 9)	( 16)	(100)

TABLE II-3

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY PROGRAM ELEMENT  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
PROGRAM ELEMENT		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
DLA		-----	-----	-----	-----	-----
64722S		9.70	0.00	0.00	0.00	9.70
(ROW%)		(100)	( 0)	( 0)	( 0)	(100)
DLA TOTAL		-----	-----	-----	-----	-----
(ROW%)		9.70	0.00	0.00	0.00	9.70
		(100)	( 0)	( 0)	( 0)	(100)
DOD TOTAL		-----	-----	-----	-----	-----
(ROW%)		80.94	87.27	35.99	111.85	316.03
		( 26)	( 28)	( 11)	( 35)	(100)

II-3-8

TABLE II-4

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET  
 CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 1990 (\$MILLIONS)

BUDGET CATEGORY	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
6.1	7.57	15.42	3.79	1.11	27.89
(ROW%)	( 27)	( 55)	( 14)	( 4)	(100)
6.2	18.99	42.94	13.74	14.10	89.78
(ROW%)	( 21)	( 48)	( 15)	( 16)	(100)
6.3	11.74	23.04	14.35	11.03	60.16
(ROW%)	( 20)	( 38)	( 24)	( 18)	(100)
6.4	45.22	0.00	5.31	62.00	112.52
(ROW%)	( 40)	( 0)	( 5)	( 55)	(100)
TOTAL	83.52	81.40	37.19	88.24	290.35
(ROW%)	( 29)	( 28)	( 13)	( 30)	(100)

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET  
 CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 1991 (\$MILLIONS)

BUDGET CATEGORY	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
6.1	8.07	15.97	3.99	1.05	29.09
(ROW%)	( 28)	( 55)	( 14)	( 4)	(100)
6.2	20.88	44.77	14.25	14.72	94.62
(ROW%)	( 22)	( 47)	( 15)	( 16)	(100)
6.3	12.17	26.51	13.49	16.16	68.33
(ROW%)	( 18)	( 39)	( 20)	( 24)	(100)
6.4	39.81	0.00	4.25	79.89	123.94
(ROW%)	( 32)	( 0)	( 3)	( 64)	(100)
TOTAL	80.93	87.25	35.98	111.83	315.99
(ROW%)	( 26)	( 28)	( 11)	( 35)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1990 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
ARMY						
6.1	(ROW%)	0.68 ( 10)	4.03 ( 61)	0.79 ( 12)	1.11 ( 17)	6.60 (100)
6.2	(ROW%)	3.23 ( 9)	20.24 ( 56)	4.17 ( 11)	8.74 ( 24)	36.38 (100)
6.3	(ROW%)	4.15 ( 19)	5.84 ( 26)	6.30 ( 28)	6.06 ( 27)	22.35 (100)
6.4	(ROW%)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	26.74 (100)	26.74 (100)
		-----	-----	-----	-----	-----
ARMY	TOTAL (ROW%)	8.06 ( 9)	30.10 ( 33)	11.26 ( 12)	42.65 ( 46)	92.07 (100)

II-5-1

TABLE II-5

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

1990 (\$MILLIONS)

DOD ORGANIZATION		CONGRESSIONAL CATEGORY				TOTAL
BUDGET CATEGORY		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
NAVY						
6.1	(ROW%)	6.89 ( 55)	2.63 ( 21)	3.01 ( 24)	0.00 ( 0)	12.53 (100)
6.2	(ROW%)	2.16 ( 16)	5.21 ( 39)	3.41 ( 26)	2.46 ( 19)	13.25 (100)
6.3	(ROW%)	5.22 ( 33)	2.47 ( 16)	7.00 ( 45)	0.97 ( 6)	15.67 (100)
6.4	(ROW%)	0.00 ( 0)	0.00 ( 0)	0.99 ( 5)	17.21 ( 95)	18.21 (100)
NAVY	TOTAL (ROW%)	----- 14.28 ( 24)	----- 10.31 ( 17)	----- 14.41 ( 24)	----- 20.65 ( 35)	----- 59.65 (100)

II-5-2

TABLE II-5

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1990 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
AF		-----	-----	-----	-----	-----
6.1	(ROW%)	0.00 ( 0)	8.76 (100)	0.00 ( 0)	0.00 ( 0)	8.76 (100)
6.2	(ROW%)	13.59 ( 34)	17.50 ( 44)	6.16 ( 15)	2.90 ( 7)	40.15 (100)
6.3	(ROW%)	2.38 ( 11)	14.73 ( 66)	1.05 ( 5)	3.99 ( 18)	22.15 (100)
6.4	(ROW%)	40.22 ( 64)	0.00 ( 0)	4.31 ( 7)	18.05 ( 29)	62.58 (100)
AF	TOTAL (ROW%)	56.19 ( 42)	40.99 ( 31)	11.52 ( 9)	24.94 ( 19)	133.63 (100)

TABLE II-5

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1990 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
		-----	-----	-----	-----	-----
DLA						
6.4		5.00	0.00	0.00	0.00	5.00
	(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
		-----	-----	-----	-----	-----
DLA	TOTAL	5.00	0.00	0.00	0.00	5.00
	(ROW%)	(100)	( 0)	( 0)	( 0)	(100)
		-----	-----	-----	-----	-----
DOD	TOTAL	83.52	81.39	37.19	88.24	290.35
	(ROW%)	( 29)	( 28)	( 13)	( 30)	(100)

II-5-4

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
ARMY		-----	-----	-----	-----	-----
6.1	(ROW%)	0.65 ( 10)	3.85 ( 61)	0.75 ( 12)	1.05 ( 17)	6.30 (100)
6.2	(ROW%)	3.22 ( 9)	20.62 ( 56)	4.13 ( 11)	8.99 ( 24)	36.96 (100)
6.3	(ROW%)	3.80 ( 17)	6.57 ( 29)	5.80 ( 25)	6.69 ( 29)	22.86 (100)
6.4	(ROW%)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	56.11 (100)	56.11 (100)
ARMY	TOTAL (ROW%)	7.67 ( 6)	31.04 ( 25)	10.68 ( 9)	72.85 ( 60)	122.24 (100)

II-5-5



TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
		CONGRESSIONAL CATEGORY				TOTAL
BUDGET CATEGORY		ET	HF	MP	ST	
-----						
NAVY						
6.1		7.43	2.84	3.24	0.00	13.50
(ROW%)		( 55)	( 21)	( 24)	( 0)	(100)
6.2		3.24	6.09	3.48	2.33	15.15
(ROW%)		( 21)	( 40)	( 23)	( 15)	(100)
6.3		5.98	2.88	6.31	5.04	20.22
(ROW%)		( 30)	( 14)	( 31)	( 25)	(100)
6.4		0.00	0.00	1.07	12.36	13.43
(ROW%)		( 0)	( 0)	( 8)	( 92)	(100)
NAVY	TOTAL	16.65	11.81	14.10	19.73	62.29
	(ROW%)	( 27)	( 19)	( 23)	( 32)	(100)

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
AF		-----	-----	-----	-----	-----
6.1	(ROW%)	0.00 ( 0)	9.29 (100)	0.00 ( 0)	0.00 ( 0)	9.29 (100)
6.2	(ROW%)	14.42 ( 34)	18.06 ( 42)	6.64 ( 16)	3.40 ( 8)	42.51 (100)
6.3	(ROW%)	2.39 ( 9)	17.06 ( 68)	1.38 ( 5)	4.43 ( 18)	25.26 (100)
6.4	(ROW%)	30.12 ( 67)	0.00 ( 0)	3.18 ( 7)	11.42 ( 26)	44.71 (100)
AF		-----	-----	-----	-----	-----
TOTAL	(ROW%)	46.92 ( 39)	44.40 ( 36)	11.20 ( 9)	19.25 ( 16)	121.77 (100)

II-5-7

TABLE II-5

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET

CONGRESSIONAL CATEGORY BY BUDGET CATEGORY  
 WITHIN DOD ORGANIZATION

DOD ORGANIZATION		1991 (\$MILLIONS)				
BUDGET CATEGORY		CONGRESSIONAL CATEGORY				TOTAL
		ET	HF	MP	ST	
DLA		-----	-----	-----	-----	-----
6.4	(ROW%)	9.69 (100)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	9.69 (100)
DLA	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	9.69 (100)	0.00 ( 0)	0.00 ( 0)	0.00 ( 0)	9.69 (100)
DOD	TOTAL	-----	-----	-----	-----	-----
	(ROW%)	80.93 ( 26)	87.25 ( 28)	35.98 ( 11)	111.83 ( 35)	315.99 (100)

II-5-8

TABLE II-6

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION  
 1990 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY	3.91	24.26	4.96	9.85	42.98
(ROW%)	( 9)	( 56)	( 12)	( 23)	(100)
NAVY	9.05	7.84	6.42	2.46	25.77
(ROW%)	( 35)	( 30)	( 25)	( 10)	(100)
AF	13.59	26.26	6.16	2.90	48.91
(ROW%)	( 28)	( 54)	( 13)	( 6)	(100)
TOTAL	-----	-----	-----	-----	-----
(ROW%)	26.56	58.36	17.53	15.21	117.67
	( 23)	( 50)	( 15)	( 0)	(100)

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION  
 1991 (\$MILLIONS)

DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY	3.87	24.47	4.88	10.05	43.26
(ROW%)	( 9)	( 57)	( 11)	( 23)	(100)
NAVY	10.67	8.93	6.72	2.33	28.65
(ROW%)	( 37)	( 31)	( 23)	( 8)	(100)
AF	14.42	27.34	6.64	3.40	51.80
(ROW%)	( 28)	( 53)	( 13)	( 7)	(100)
TOTAL	-----	-----	-----	-----	-----
(ROW%)	28.95	60.74	18.24	15.78	123.71
	( 23)	( 49)	( 15)	( 0)	(100)

TABLE II-7

TPST PROGRAM FUNDING IN 1990  
 BASED ON FY91 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION  
 1990 (\$MILLIONS)

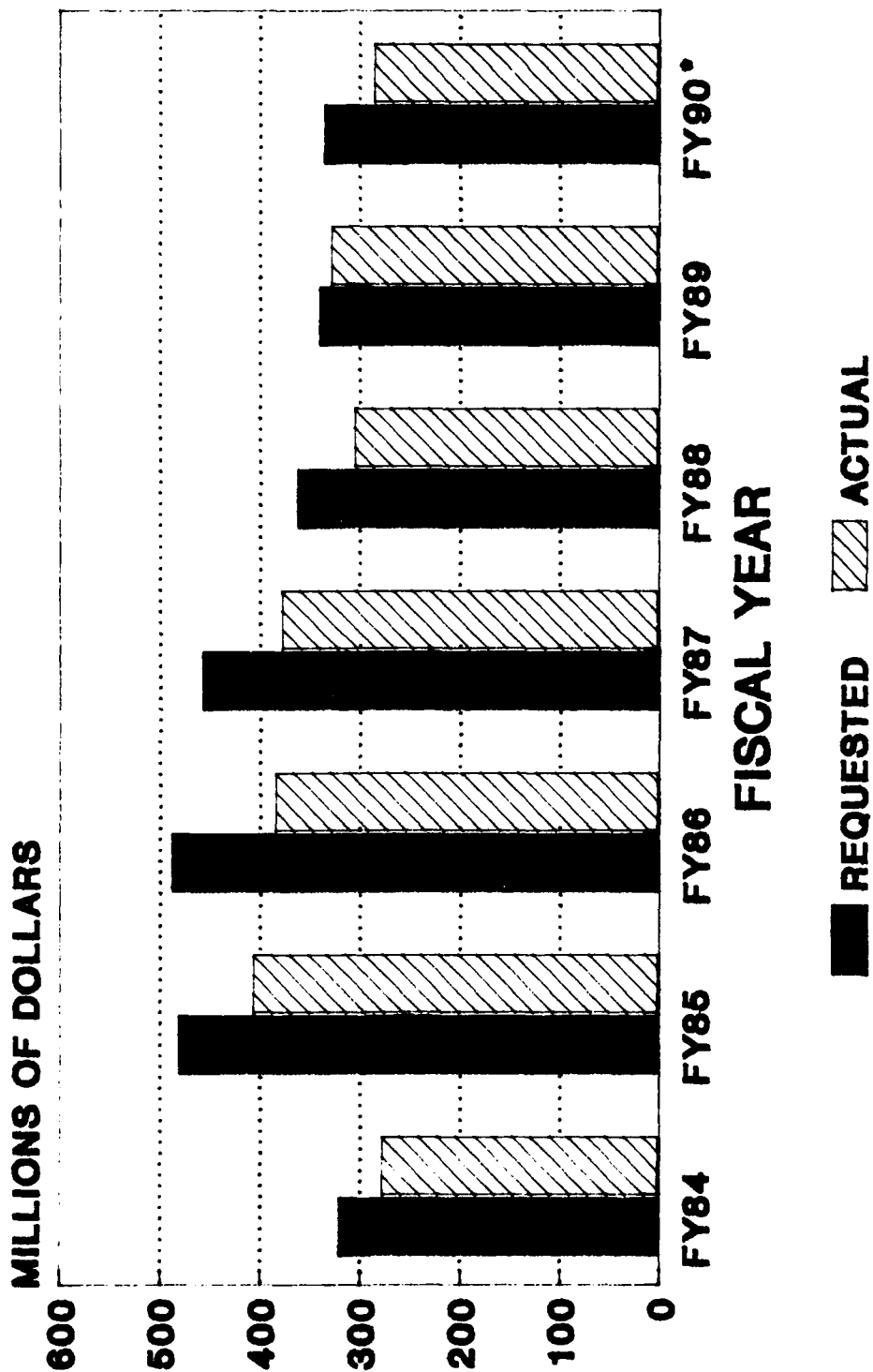
DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY (ROW%)	8.06 ( 12)	30.10 ( 46)	11.26 ( 17)	15.91 ( 24)	65.33 (100)
NAVY (ROW%)	14.28 ( 34)	10.31 ( 25)	13.42 ( 32)	3.44 ( 8)	41.44 (100)
AF (ROW%)	15.97 ( 22)	40.99 ( 58)	7.21 ( 10)	6.89 ( 10)	71.05 (100)
	-----	-----	-----	-----	-----
TOTAL (ROW%)	38.30 ( 22)	81.39 ( 46)	31.89 ( 18)	26.24 ( 15)	177.82 (100)

TPST PROGRAM FUNDING IN 1991  
 BASED ON FY91 PRESIDENT'S BUDGET  
 FOR BUDGET CATEGORY = 6.1,6.2,6.3

CONGRESSIONAL CATEGORY BY DOD ORGANIZATION  
 1991 (\$MILLIONS)

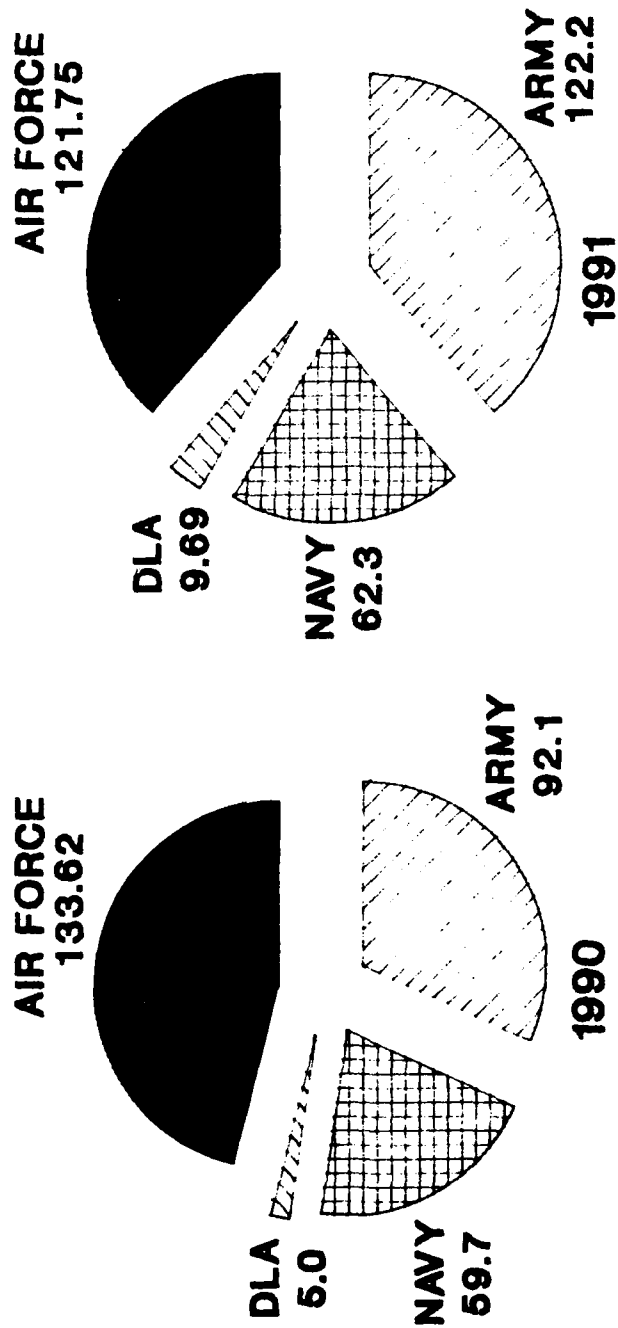
DOD ORGANIZATION	CONGRESSIONAL CATEGORY				TOTAL
	ET	HF	MP	ST	
	-----	-----	-----	-----	-----
ARMY (ROW%)	7.67 ( 12)	31.04 ( 47)	10.68 ( 16)	16.74 ( 25)	66.12 (100)
NAVY (ROW%)	16.65 ( 34)	11.81 ( 24)	13.03 ( 27)	7.37 ( 15)	48.87 (100)
AF (ROW%)	16.80 ( 22)	44.40 ( 58)	8.02 ( 10)	7.83 ( 10)	77.06 (100)
	-----	-----	-----	-----	-----
TOTAL (ROW%)	41.12 ( 21)	87.25 ( 45)	31.73 ( 17)	31.94 ( 17)	192.05 (100)

# **REQUESTED VS ACTUAL PROGRAM FUNDING BASED ON THE PRESIDENT'S BUDGET**

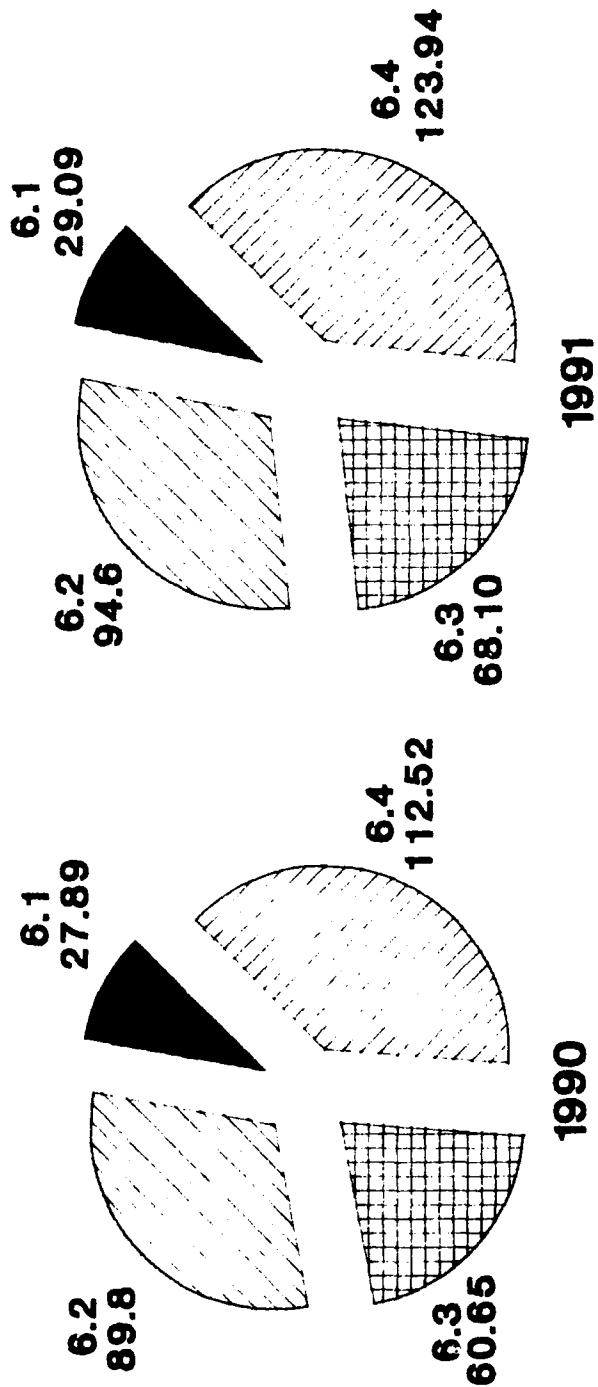


•ADJUSTED

# TPST PROGRAM FUNDING BASED ON THE AMENDED FY91 PRESIDENT'S BUDGET BY SERVICE



# TPST PROGRAM FUNDING BASED ON THE AMENDED FY91 PRESIDENT'S BUDGET BY BUDGET CATEGORY





### III. PROGRAM ELEMENT AND PROJECT SYNOPSES

TRAINING AND PERSONNEL SYSTEMS TECHNOLOGY  
PROGRAM FUNDING BY SERVICE - JAN 1990

PE	TITLE	(\$ MILLIONS)				
		FY88	FY89	FY90	FY91	
-----						
ARMY						
----						
61102A	DEFENSE RESEARCH SCIENCES	7.0	6.8	6.7	6.4	
62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY	15.6	18.1	15.1	15.4	
62717A	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	0.0	0.0	0.0	0.0	
62722A	MANPOWER, PERSONNEL AND TRAINING	0.0	0.0	0.0	0.0	
62727A	NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY	3.6	3.7	4.5	4.6	
62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY	15.1	17.4	17.0	17.2	
63003A	AVIATION ADVANCED TECHNOLOGY	4.6	4.7	4.0	3.9	
63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	28.5	28.7	18.9	18.8	
63216A	SYNTHETIC FLIGHT SIMULATOR DEVELOPMENT	0.0	0.0	0.0	0.0	
63731A	MANPOWER AND PERSONNEL	0.0	0.0	0.0	0.0	
63736A	HUMAN FACTORS ENGINEERING APPLICATIONS	0.0	0.0	0.0	0.0	
63738A	NON-SYSTEM TRAINING DEVICES (NSTD) ADVANCED DEVELOPMENT	0.0	0.0	0.0	0.0	
63739A	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS	0.0	0.0	0.0	0.0	
63743A	EDUCATION AND TRAINING	0.0	0.0	0.0	0.0	
63744A	TRAINING SIMULATION	0.0	0.0	0.0	0.0	
64217A	SYNTHETIC FLIGHT TRAINING SYSTEMS	0.0	0.0	0.0	0.0	
64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT	27.5	22.3	16.2	41.9	
64722A	EDUCATION AND TRAINING SYSTEMS DEVELOPMENT	5.4	6.8	0.1	0.1	
64801A	AVIATION ENGINEERING DEVELOPMENT	5.8	4.4	10.7	14.3	
SUBTOTAL - ARMY		:	112.7	112.5	92.6	122.0
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NAVY						
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61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES	10.1	11.7	12.6	13.6	
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	0.5	0.5	0.6	0.6	
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	6.6	6.8	8.4	10.4	
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	3.7	4.2	4.4	4.3	
62744N	MARINE CORPS AIR-GROUND TECHNOLOGY	0.0	0.0	0.0	0.0	
62757N	HUMAN FACTORS AND SIMULATION TECHNOLOGY	0.0	0.0	0.0	0.0	
62763N	PERSONNEL AND TRAINING TECHNOLOGY	0.0	0.0	0.0	0.0	
63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	2.6	2.5	2.5	2.9	
63707N	MANPOWER AND PERSONNEL SYSTEMS	3.1	3.2	3.1	3.3	
63710N	MAN-MACHINE TECHNOLOGY	0.0	0.0	0.0	0.0	
63720N	EDUCATION AND TRAINING	5.1	5.3	5.3	6.0	
63727N	ADVANCED TECHNOLOGY FOR LOGISTICS INFORMATION	0.0	0.0	0.0	0.0	
63732M	ADVANCED MANPOWER/TRAINING SYSTEMS	2.2	3.1	4.0	3.2	
63733N	SIMULATION AND TRAINING DEVICE TECHNOLOGY	8.3	6.3	1.0	5.1	
63739N	NAVY LOGISTICS PRODUCTIVITY	1.0	0.0	0.0	0.0	
64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	1.0	1.1	1.0	1.1	
64709N	JOINT SERVICE MANPOWER/PERSONNEL PROTOTYPES	0.0	0.0	0.0	0.0	
64714N	AIR WARFARE TRAINING DEVICES	0.0	0.0	0.0	0.0	
64715N	SURFACE WARFARE TRAINING	16.9	18.4	17.3	12.4	
64716N	SUBMARINE WARFARE TRAINING DEVICES	0.0	0.0	0.0	0.0	
SUBTOTAL - NAVY		:	60.6	62.5	59.6	62.3

TRAINING AND PERSONNEL SYSTEMS TECHNOLOGY  
PROGRAM FUNDING BY SERVICE - JAN 1990

PE	TITLE	(\$ MILLIONS)			
		FY88	FY89	FY90	FY91
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AIR FORCE					
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61102F	DEFENSE RESEARCH SCIENCES	9.0	9.2	8.8	9.3
62202F	HUMAN SYSTEMS TECHNOLOGY	12.2	11.4	12.0	12.1
62205F	PERSONNEL, TRAINING, AND SIMULATION	30.9	32.7	28.2	30.6
62703F	PERSONNEL UTILIZATION TECHNOLOGY	0.0	0.0	0.0	0.0
63106F	LOGISTICS SYSTEMS TECHNOLOGY	8.4	13.7	9.2	11.8
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	7.8	8.3	7.5	8.2
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	6.3	5.7	5.7	5.4
63365F	SPACE BIOTECHNOLOGY	0.0	0.0	0.0	0.0
63704F	MANPOWER AND PERSONNEL SYSTEMS TECHNOLOGY	0.0	0.0	0.0	0.0
63751F	TRAINING SYSTEMS TECHNOLOGY	0.1	0.0	0.0	0.0
64227F	FLIGHT SIMULATOR DEVELOPMENT	50.6	63.0	58.2	41.3
64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT	0.1	0.1	4.4	3.5
		-----			
SUBTOTAL - AIR FORCE:		124.7	143.7	133.6	121.8
DLA					
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64722S	JOINT SERVICE TRAINING SYSTEMS	7.2	9.8	5.1	9.7
		-----			
SUBTOTAL - DLA :		7.2	9.8	5.0	9.7
		-----			
TOTAL:		305.1	328.5	290.8	315.7

TRAINING AND PERSONNEL TECHNOLOGY  
RESEARCH ORGANIZATIONS

ARMY

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AVSCOM	Army Aviation Systems Center
ARI	Army Research Institute
HEL	Army Human Engineering Laboratory
PMTRADE	Project Manager for Training Devices

NAVY

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HQMC	Headquarters, US Marine Corps
NADC	Naval Air Development Center
NAMRL	Naval Aerospace Medical Research Laboratory
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NOSC	Naval Ocean Systems Center
NPRDC	Navy Personnel Research and Development Center
NSWC	Naval Surface Weapons Center
NTSC	Naval Training Systems Center
ONR	Office of Naval Research

AIR FORCE

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AAMRL	Armstrong Aerospace Medical Research Laboratory
AFHRL	Air Force Human Resources Laboratory
AFOSR	Air Force Office of Scientific Research
AMD	Aerospace Medical Division
TS SPO	Deputy for Training Systems
HSD	Human Systems Division

DLA

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DLA	Defense Logistics Agency
TPDC	Training Performance Data Center
FM&P	Force Management & Personnel

### III.A. ARMY PROGRAM ELEMENT AND PROJECT SYNOPSES

PE	TITLE	PAGE
61102A	DEFENSE RESEARCH SCIENCES	III-A-1
62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY	III-A-8
62727A	NON-SYSTEM TRAINING DEVICES TECHNOLOGY	III-A-12
62785A	MANPOWER, PERSONNEL AND TRAINING TECHNOLOGY	III-A-15
63003A	AVIATION ADVANCED TECHNOLOGY	III-A-21
63007A	HUMAN, FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	III-A-26
64715A	NON-SYSTEM TRAINING DEVICES-ENGINEERING DEVELOPMENT	III-A-35
64801A	AVIATION ENGINEERING DEVELOPMENT	III-A-42

Table III-A-1: Listing of Projects - Lists projects for each ARMY program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-A-i

## PROGRAM ELEMENT OVERVIEW

PE: 61102A                      DEFENSE RESEARCH SCIENCES

CONGRESSIONAL CATEGORY:      EDUCATION & TRAINING  
                                  HUMAN FACTORS  
                                  MANPOWER & PERSONNEL  
                                  SIMULATION & TRAINING DEVICES

DoD ORGANIZATION:            ARMY

FUNDING:                      FY90 \$ 6.6M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 6.3M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to produce data, concepts, and technology needed to support applied R&D advances in MPT.

This is the US Army core research program to sustain the science and engineering base required to exploit new opportunities in rapidly advancing technological fields. The program supports theoretical and experimental research in the physical, mathematical, biological, environmental, terrestrial and behavioral sciences. This research is focused on the Army's key goals for effectiveness in the airland battle environment and the Army 21 concept to provide a lethal, integrated, supportable, highly mobile force with enhanced soldier effectiveness. Research areas are determined and prioritized in order to meet Army needs as stated in mission area analyses and in Army 21, and to exploit scientific opportunities. This core research program is complemented by the inter-disciplinary research performed under the University Research Initiative (URI) program.

The work in this Program Element is consistent with the Army's resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies and advanced technology transition demonstrations (ATTDs) are funded on a priority basis.

The work is performed by 31 Army laboratories and activities and by academic institutions, not-for-profit organizations, and industrial laboratories through contracts and grants.

## RELATED ACTIVITIES:

Program Element #0601103D, University Research Initiative; the Navy, Air Force, and other Department of Defense agencies; National Aeronautics and Space Administration; National Science Foundation; Department of the Interior; Department of Energy; National Bureau of Standards; other Government agencies; and government agencies of Allied nations sponsor related research in areas of this program.

Coordination to eliminate duplication is accomplished by: (a) tri-Service topical reviews, (b) exchange of progress reports and technical reports, (c) inter-Service/agency liaison, and (d) formal national and international meetings and symposia. Informal coordination occurs through: (a) visits to governmental, industrial, and academic laboratories and installations, (b) review of the scientific literature, and (c) publications of current research. The Army's Defense Research Sciences Program is included in the Tri-Service Technology Coordinating Papers.

The Army Research Office, which is the Army's primary interface to the university community, maintains cognizance of free-world research that is potentially relevant to the Army in addition to maintaining liaison offices

in Japan and Europe.

**PAYOFF/UTILIZATION:**

The payoff of the MPT portion of this Program Element is a behavioral science base on which to build new technologies to improve the effectiveness of soldiers and systems.

This basic research's contribution to the Army lies substantially in seeding new exploratory and advanced development to enhance soldier performance and behavior, and in enlisting civilian scientific skills and facilities (university and industry) to cooperatively address Army needs to explore and transition new technologies into application to solve Army personnel problems.

**FUTURE DIRECTIONS:**

Beyond FY91, plans for this Program Element include supporting research in three areas: (a) learning, cognition and problem solving, (b) human performance and decision making, and (c) group functioning and communicative processes.

## PROJECT OVERVIEW

		90	91
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PROJECT: B74A	HUMAN ENGINEERING	\$ 3.0M	\$ 2.9M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to support research in soldier performance, sensor/information processing and other elements of soldier-machine interface critical to the design of Army weapons systems.

In FY90, plans include: (a) developing and providing to the Tank Automotive Command (TACOM) preliminary combat vehicle design information with respect to non-detectability of U.S. armor vehicles and systems, (b) expanding communication studies to establish the relationship between speech intelligibility and aviation combat operations; evaluations of both armor and aviation intelligibility levels will be conducted to determine the relationship between levels of speech intelligibility and crew combat mission performance, and (c) developing a metric to measure hit probability and soldier marksmanship performance when subjected to "combat-like" stresses for transition to Army analysis and design communities; data will also be provided to the Armament Research, Development and Engineering Center (ARDEC) as well as the Infantry School for incorporation into the Advanced Combat Rifle Technology assessment.

In FY91, plans include: (a) expanding research efforts in visual detection and recognition to further develop the visual application to aided target recognition systems, and (b) based on previous intelligibility studies, developing a metric to be used in evaluating the effect of speech intelligibility on crew performance for application to combined arms operations.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) the enhancement of the soldier-machine interface, to increase the soldier's ability to operate and maintain Army materiel, and (b) reduction of the manpower required to accomplish Army missions.

In FY89 specific accomplishments included: (a) conducting a preliminary laboratory experiment to better quantify and further isolate those visual features that lead to rapid detection and recognition of friendly and threat combat vehicle systems; data will contribute to the design of future combat vehicles and aided target recognition systems, (b) completion of a comprehensive experimental evaluation of combat vehicle noise and communication between crew members within the vehicle, the vehicle commander and higher levels of command; evaluation results indicated that crew performance and thus total combat vehicle system performance was adversely affected; new noise cancelling communication technology is being investigated to overcome the performance degradation, and (c) successful completion of a major field exercise utilizing 120 Army and Marine Corps riflemen to determine the quantitative effects of combat-like stress effects on marksmanship performance; data has been analyzed and is being transitioned for use in future small arms design, and battlefield simulation and modeling.



## PROJECT OVERVIEW

		90	91
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PROJECT: B74F-ET	PERSONNEL PERFORMANCE AND TRAINING	\$ 0.7M	\$ 0.7M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in three areas of human performance: (a) decision-making in stressful environments and countermeasures for performance decrements, (b) processes and variables determining effective and efficient group functioning (e.g., leader-group interaction, group problem-solving), and (c) theoretical understanding of computer-mediated methods (such as artificial intelligence) for promoting cognitive and perceptual learning in individuals and groups.

This Task supports the Education and Training (ET) portion of this Project.

In FY90, plans include developing a theory of cooperative group learning to specify relationships between issues such as personnel turnover and group performance.

In FY91, plans include determining how human communication processes influence group problem-solving and decision-making in realistic environments.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) training cost reductions, (b) more effective unit training and performance, and (c) provision of a force multiplier effect.

In FY89, specific accomplishments included: (a) determination of training parameters that support long-term retention of skills not practiced frequently, and (b) use of new communication techniques to extend a theory of learning in complex domains (such as foreign languages and military strategy).

## PROJECT OVERVIEW

		90	91
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PROJECT: B74F-HF	PERSONNEL PERFORMANCE AND TRAINING	\$ 1.0M	\$ 1.0M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in three areas of human performance: (a) decision-making in stressful environments and countermeasures for performance decrements, (b) processes and variables determining effective and efficient group functioning (e.g., leader-group interaction, group problem-solving), and (c) theoretical understanding of computer-mediated methods (such as artificial intelligence) for promoting cognitive and perceptual learning in individuals and groups.

This Task supports the Human Factors (HF) portion of this Project.

In FY90, plans include: (a) analyzing the behavioral elements of communication and determining how each affects understanding of information transmitted to spatially-separated, but electronically-linked, groups, (b) investigating the influence of high workload and other performance determinants on human error, and examining the implications for the design of safety-enhancement programs, and (c) investigating the interactions of human time perception and task characteristics as determinants of accuracy and effectiveness of performance.

## PAYOFF/UTILIZATION:

The payoff of this Project includes better and more effectively utilized manpower, personnel, and training data, resulting in equipment that can be more mission-effective and easier to train and maintain.

In FY89, specific accomplishments included testing a model of cognition in human-machine interfaces that uses human memory retrieval as the basis for the retrieval of computer-stored information.

## PROJECT OVERVIEW

		90	91
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PROJECT: B74F-MP	PERSONNEL PERFORMANCE AND TRAINING	\$ 0.8M	\$ 0.8M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in three areas of human performance: (a) decision-making in stressful environments and countermeasures for performance decrements, (b) processes and variables determining effective and efficient group functioning (e.g., leader-group interaction, group problem-solving), and (c) theoretical understanding of computer-mediated methods (such as artificial intelligence) for promoting cognitive and perceptual learning in individuals and groups.

This Task supports the Manpower and Personnel (MP) portion of this Project.

In FY90/91, plans include: (a) identifying variables and mechanisms involved in the formation of individual-organization relationships, as determinants of organizational reliability in high-risk situations, and (b) empirically determining the role of individual differences and other factors in performance under stress.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) providing the basis for designing planning and decision aids that can organize, analyze, and synthesize data in ways which will be maximally useful in Command, Control, Communication and Information (C3I) contexts, and (b) enabling the Army to more effectively aid and train its leaders to make decisions.

In FY89, specific accomplishments included: (a) proposing theories that predict, and working techniques that enhance, human performance relating to safety, courage, and practical intelligence, and (b) testing the theory of stress-bound military performance to produce stress reduction.

## PROJECT OVERVIEW

		90	91
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PROJECT: B74F-ST	PERSONNEL PERFORMANCE AND TRAINING	\$ 1.1M	\$ 1.1M
PE: 61102A	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to conduct behavioral science research in three areas of human performance: (a) decision-making in stressful environments and countermeasures for performance decrements, (b) processes and variables determining effective and efficient group functioning (e.g., leader-group interaction, group problem-solving), and (c) theoretical understanding of computer-mediated methods (such as artificial intelligence) for promoting cognitive and perceptual learning in individuals and groups.

This Task supports the Simulation and Training (ST) portion of this Project.

In FY90/91, plans include studying techniques to enhance human performance, and perceptual learning in the acquisition of flight skills.

## PAYOFF/UTILIZATION:

The payoffs of this Task include the necessary knowledge to develop more effective Army systems by improving both the skills of the soldiers who operate the systems, and by reducing the apparent complexity and difficulty of equipment operation itself.

## PROGRAM ELEMENT OVERVIEW

PE: 62716A HUMAN FACTORS ENGINEERING TECHNOLOGY  
 CONGRESSIONAL CATEGORY: HUMAN FACTORS  
 DoD ORGANIZATION: ARMY  
 FUNDING: FY90 \$ 15.0M (FY91 PRESIDENT'S BUDGET)  
 FY91 \$ 15.3M (FY91 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to maximize the effectiveness of the soldier and his materiel in order to survive and prevail on the battlefield.

Soldiers using materiel win wars, and for materiel to be most effectively used by soldiers, it must be designed specifically for soldiers. The rapid changes in technology, and the ever increasing emphasis on soldier and equipment performance, provides the driver for this effort. Specialized laboratory investigations and field evaluations are conducted to collect performance data on the capabilities and limitations of soldiers, with particular attention on soldier and equipment interaction. The resulting data are the basis for weapon systems and equipment design standards, guidelines, handbooks, and soldier training requirements to improve equipment operation and maintenance. The application yields reduced workload, fewer errors, enhanced soldier protection, user acceptance, and allows the soldier to extract the maximum performance from his system.

This Program Element also provides funds for overall administration and management of RDTE, A laboratories. The costs include salary, travel, equipment, and general support of civilian management personnel and their administrative support staffs.

The work in this Program Element is consistent with the Army's resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies and Advanced Technology Transition Demonstrations (ATTDs) are funded on a priority basis.

The in-house work within this Program Element will be performed by the U.S. Army Human Engineering Laboratory (HEL).

## RELATED ACTIVITIES:

Leader in tri-Service coordination through the DoD Human Factors Technology Advisory Group, US Army Missile Command (MICOM) agent for Human Factors (HFAC) Standardization. There is no unnecessary duplication of effort within DoD.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include technologies, designs, data, and procedures that: (a) reduce workload, errors, and time to accomplish tasks, (b) increase soldier protection and soldier equipment compatibility for individual and crew weapons in aviation, armor, artillery, and air defense, and (c) enhance particular individual items of equipment, information displays, operating controls, computer programs, and crew working environments.

FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in human factors engineering system development in the areas of: (a) command and control concepts, (b) artificial intelligence and expert systems concepts, (c) battlefield decision-making in conjunction with TRADOC, and (d) support for combat/materiel developers.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: AH70	HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT	\$15.0M	\$15.3M
PE: 62716A	HUMAN FACTORS ENGINEERING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) generate data on soldier-system interfaces, soldier-system performance, as well as the capabilities and limitations of soldiers, and (b) provide for the application of these data throughout the Army materiel development process.

In FY90, plans include: (a) demonstrating innovative robotic field materiel handling concepts which will increase productivity in the handling of ammunition in forward area ammunition supply points; concepts will transition to Belvoir Research and Development Engineering Center (BRDEC), (b) conducting research to quantify the portability and physiological energy cost of carrying various infantry equipment loads under simulated battlefield conditions; data will assist materiel developers in efforts to lighten the soldier's load, (c) completing a combat vehicle design handbook to assist materiel developers in crew area noise reduction for future armored vehicles, (d) conducting human factors engineering evaluations of advanced combat rifles focusing on such issues as round-to-round dispersion and reliability in order to improve overall performance, and (e) continuing direct human factors engineering (HFE) support to and conduct HFEAs for combat/materiel developers as part of the MANPRINT process.

In FY91, plans include: (a) initiating field evaluations of new command and control concepts and target cuing techniques to improve the soldier-command-control-communication (C3) interface in a combined arms forward area air defense battlefield situation; will transition results to TRADOC, (b) conducting laboratory technology developments in artificial intelligence and expert systems to determine the feasibility of the concepts developed in FY89 for the knowledge-based decision support system for tactical ammunition management; research is aimed at improving Army logistics capabilities and planning under battlefield conditions, (c) conducting and completing an evaluation of field artillery battlefield decision-making in conjunction with TRADOC; includes allocation and positioning of units as well as coordination and distribution of fires in order to develop a comprehensive fire support decision aid for battlefield application, and (d) continuing direct support to and conduct HFEAs for combat/materiel developers as part of the MANPRINT process.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) human performance data and design guidance for equipment worn, operated, or maintained by soldiers, and (b) specific, precise information on soldiers' physical and psychological capabilities and limitations so that sophisticated Army materiel systems will be designed for maximum field effectiveness.

In FY89, specific accomplishments included: (a) development of artificial intelligence/expert system concepts for a knowledge-based decision support

system for tactical ammunition management in order to reduce soldier workload and increase efficiency, (b) provision of human factors guidelines for Small Arms Design incorporating performance data pertaining to hit probability, sustainability, and target acquisition capability; the guide will be used by system designers to ensure soldier and individual weapon compatibility, (c) evaluation of the fire support maneuver commander's tasks, equipment and information requirements to determine the efficacy of using automation tools/digital display devices as commander aids for combat decision-making; transitioned successfully demonstrated products to the Training and Doctrine Command (TRADOC), and (d) development of two teleoperated experimental robotic concept vehicles to be used as testbeds to determine critical design parameters for robotic manipulator control devices, integration of manipulators with three dimensional viewing, and vehicle mobility through low data rate communications links.



## PROGRAM ELEMENT OVERVIEW

PE: 62727A                      NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY  
CONGRESSIONAL CATEGORY:      SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION:            ARMY  
  
FUNDING:                      FY90 \$ 4.4M (FY91 PRESIDENT'S BUDGET)  
                                FY91 \$ 4.5M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to provide exploratory development of state-of-the-art generic training methods and equipment to increase overall combat effectiveness while reducing Army training costs.

Arrival of sophisticated, high-technology equipment and their complex relations to each other, coupled with increased constraints on personnel, money, and time in the field training environment, makes this effort critical to the overall success of the Army. As an example, support from this program resulted in a Multiple Integrated Laser Engagement Simulation System (MILES), Gas-Operated Cannon Simulator for 20mm, 25mm, and 30mm ammunition, which eliminated the need to develop and produce blank rounds, at a peacetime savings per year of over \$10M.

The work in this Program Element is consistent with the Army's resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies and advance technology transition demonstrations (ATTDs) are funded on a priority basis.

This work is performed by the Project Manager for Training Devices (PM TRADE), and the Army Research Institute (ARI).

## RELATED ACTIVITIES:

PE #0603738A and PE #0604715A (Non-System Training Devices Advanced Development and Engineering Development).

Activities are coordinated through tri-Service participation of DMA, NAVAIR, and Air Force Deputy for Training Systems to ensure no duplication.

## PAYOFF/UTILIZATION:

The payoff of this Program Element includes support for the development of technology for training devices that ties together battlefield weapon systems, mobility, and command, control, communications, and transfers this training to real-world combat effectiveness.

Previously, this program supported exploratory development which resulted in, for example, a Multiple Integrated Laser Engagement Simulation System (MILES) gas-operated cannon simulator for 20mm, 25mm, and 30mm ammunition which eliminated the need to develop and produce blank rounds, resulting in peacetime savings per year of over \$10M.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include (a) continuing progress in transitioning findings from the National Training Center concept exploratory studies, (b) implementing Modular Simulator Design Standards, and (c) initiating Training Effectiveness Evaluation of New Emerging Simulation

Technologies.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: A230	NON-SYSTEM TRAINING DEVICES	\$ 4.4M	\$ 4.5M
PE: 62727A	NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to provide for the exploratory development of training devices technology that supports general military training and training on more than one item or system.

This program provides the necessary front-end analytical effort needed to transition suitable developments into full-scale development.

In FY90, plans include: (a) demonstrating the feasibility of simulating Intelligence/Electronic Warfare systems with real-time, non-emitting, simulated threat emission signatures for training at the National Training Center and in field units, and (b) publishing modular simulator design standards as part of the tri-Service/Industry Joint Technical Coordinating Group for Training Systems and Devices program.

In FY91, plans include: (a) completing and transitioning successful findings from NTC concept exploratory studies into ongoing developmental efforts and acquisition of simulation software and simulators to expand from battalion size to brigade size training capability, (b) implementing Modular Simulator Design Standards, and (c) initiating Training Effectiveness Evaluation of New Emerging Simulation Technologies that have been investigated by the Institute for Simulation and Training.

## PAYOFF/UTILIZATION

The payoff of this Project includes a variety of exploratory development efforts in training devices technology to support general military training and training on more than one item or system.

Non-system training device requirements vary in scope and complexity and include simulations to support force-on-force engagement simulation training, collective training of crews and units (as well as individual basic skills) and integration and sustainment training. Results of this Project's technology base efforts are inserted directly into advanced simulator designs, or transitioned to a product-oriented demonstration, or directly into production.

FY89 specific accomplishments included: (a) initiation of an interdisciplinary program for optimization and evaluation of Army training devices with the University of Central Florida Institute for Simulation and Training to explore in coordination with industry: (1) large scale simulation networking techniques, (2) development of modular simulator design standards, (3) rapidly reconfigurable simulator databases, and (4) training systems measures of effectiveness, and (b) initiation of NTC upgrade concept exploratory studies to evaluate the use of simulation as a cost effective means of expanding from battalion size to brigade size training capability.

## PROGRAM ELEMENT OVERVIEW

PE: 62785A                      MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY

CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
                                 SIMULATION & TRAINING DEVICES  
                                 EDUCATION & TRAINING  
                                 MANPOWER & PERSONNEL

DoD ORGANIZATION:            ARMY

FUNDING:                      FY90 \$ 17.0M (FY91 PRESIDENT'S BUDGET)  
                                 FY91 \$ 17.1M (FY91 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide new technology for maximizing soldier and unit performance by experimentally determining: (a) how the soldier's workload can be "shifted from the head to the hardware," in the design of new weapon systems, (b) how information must be made available to system designers to ensure compatible man-machine systems, (c) how simulator and training device design features are necessary to ensure effective training at minimal cost, and (d) how behavioral sciences can improve the recruiting, selection, and retention of quality soldiers in this high technology environment. Accomplishments from this Program Element transition to Program Element 63007A for advanced technology development.

The work within this Program Element is consistent with the Army's resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies and advanced technology transition demonstrations (ATTDs) are funded on a priority basis.

## RELATED ACTIVITIES:

Results of this project transition to Advanced Development in Program Element #0603007A (Human Factors, Personnel and Training Advanced Technology). Potential for duplication of effort is avoided through an annual Science and Technology Program Review chaired by a representative of the Office of the Secretary of Defense. Coordination is furthered through Department of Defense (DoD) Topical Reviews, participation in the DoD Human Factors Engineering Technical Group, and the DoD/NASA Simulation Technology Coordination Panel. This Program Element is further coordinated with the Army Project Manager for Training Devices (PM TRADE), the Army Human Engineering Laboratory (HEL), and with personnel research and development organizations of the other Services: the Air Force Human Resources Laboratory (AFHRL), the Navy Personnel Research and Development Center (NPRDC), and the Naval Training Systems Center (NTSC).

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include a scientifically sound technology base to support the: (a) development of engineering designs for new systems so that strengths and limitations of operators and maintainers are appropriately utilized or compensated for, (b) the development of improved methods for attracting, selecting, assigning, and retaining quality soldiers, and (c) the development of methods for improving individual and collective (unit) training.

## FUTURE DIRECTIONS:

Future plans include continuing efforts to: (a) achieve a better understanding of the optimal interface and division of labor between man and

machine, as well as of how human factors, manpower, personnel, and training information are considered in new weapon systems, (b) improve decision-making in command and control operations, (c) ensure the most cost-effective soldier selection and assignment, (d) target enlistee training requirements more precisely, and (e) focus on new personnel selection and training issues.

## PROJECT OVERVIEW

		90	91
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PROJECT: A790-HF	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	\$ 1.9M	\$ 2.0M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) determine the most effective integration of human decision makers and automated information technology in new Army systems, (b) determine the contributions of human factors, manpower, personnel, and training variables to weapon system performance and unit effectiveness, and (c) determine the minimum design requirements for simulators/training devices that will achieve effective training at the lowest cost.

In FY90, it is planned to: (a) develop prototype risk-awareness estimation techniques for reducing accidents in "live fire" artillery training exercises, and (b) develop artificial intelligence (AI)-based techniques to assist military linguists to acquire and sustain job-relevant foreign language skills.

In FY91 it is planned to: (a) develop prototype methods for predicting weapon system and unit performance degradation due to soldier stress, sleep loss and fatigue, crew turnover, and levels of personnel experience, (b) determine crew selection criteria that can potentially reduce Army aviation accidents caused by human error, and (c) determine collective staff skill requirements for the Army Tactical Command and Control System.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved use of human capabilities and modern technology in the design of new systems to ensure greater effectiveness in the battlefield.

In FY89, specific accomplishments included: (a) the development of a prototype model for assessing stress and fatigue effects on combat unit performance, (b) development of methods for determining the human factors causes of accidents in Army aviation, (c) the development of an intelligence and electronic warfare (IEW) processing and utility evaluation model for division-level intelligence support, and (d) the development of a prototype model for assessing the impact of soldier errors on total system performance.

## PROJECT OVERVIEW

		90	91
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PROJECT: A790-ST	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION	\$ 2.2M	\$ 2.3M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of the Simulation and Training Devices portion of this Project are to experimentally and empirically determine the minimum design requirements for simulators/training devices that will achieve effective training at the lowest cost.

In FY90 it is planned to: (a) develop an improved prototype tactical battle staff training technology, (b) develop preliminary graphic procedures for more effective exchange of tactical planning data within a command and control system, (c) develop joint U.S./Canada flight simulator testbed, and (d) develop and evaluate preliminary crew/team/unit tank gunnery training and testing strategies.

In FY91 it is planned to: (a) empirically determine minimum visual fidelity requirements for effective flight simulator training, and (b) develop preliminary rules for deciding what training should be "embedded" in weapons systems.

## PAYOFF/UTILIZATION:

The payoffs of this Project include cost-effective training by determining the minimum design requirements for simulators and training devices that will achieve effective training at the least cost.

In FY89, specific accomplishments for the Simulation and Training Devices portion of this Project included the development of a preliminary performance measurement and feedback system for armor systems utilizing state-of-the-art simulation network (SIMNET) technology.

## PROJECT OVERVIEW

		90	91
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PROJECT: A791-ET	MANPOWER, PERSONNEL AND TRAINING	\$ 3.2M	\$ 3.2M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project are to provide the scientific basis for: (a) improved methods for force structure planning, selection testing, and leader development, (b) training methods to cost-effectively provide high technology skills for soldiers in both the Active Army and the Reserve Component, (c) integrated methods of estimating manpower levels and soldier skills required by new Army weapon systems, and (d) methods for assessing and improving unit skill acquisition and performance.

In FY90 it is planned to: (a) develop a preliminary model of collective skill acquisition and retention based on task characteristics and performance requirements, (b) design automated tools to aid training program developers, and (c) develop preliminary models of skill acquisition and retention for complex cognitive tasks.

In FY91 it is planned to: (a) develop and test skill acquisition and retention model for complex skills, and (b) develop methods for estimating required frequency of refresher training in units, by type of task, to assure skill retention.

## PAYOFF/UTILIZATION:

The payoff of this Project includes improved methods for meeting future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel.

In FY89, specific accomplishments included refinement and evaluation of new methods of job analysis and new procedures for setting performance standards for enlisted Military Occupational Specialities.



## PROJECT OVERVIEW

		90	91
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PROJECT: A791-MP	MANPOWER, PERSONNEL AND TRAINING	\$ 4.2M	\$ 4.1M
PE: 62785A	MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of the Manpower and Personnel portion of this Project are to provide the scientific basis for: (a) improved force structure planning, selection testing, and leader development, and (b) integrating methods for estimating manpower levels and soldier skills required by new Army weapon systems.

In FY90 it is planned to: (a) develop a preliminary, behaviorally sound model that can be used to simulate the impact of personnel policies and incentives on the enlisted force structure, (b) build a comprehensive enlisted and officer database to track career paths of soldiers entering John F. Kennedy Special Warfare Center, for future research and development, and (c) develop preliminary model of enlisted retention intentions and subsequent behavior, using results from Recruit Experience Tracking Survey.

In FY91 it is planned to: (a) develop the methodology to generate job performance prediction equations and selection standards, (b) complete evaluation of new methodologies for executive development, and (c) build and test models of the interaction among first-term Army career experiences, career performance, and retention.

## PAYOFF/UTILIZATION:

The payoff of this Project includes improved methods for meeting future demands for recruiting, selecting, assigning, training, and effectively utilizing personnel.

In FY89, specific accomplishments included: (a) development of a comprehensive enlisted force database of accessions during the All Volunteer Force era, (b) development of a methodology to estimate the effects on retention of changes in pay, bonuses, retirement benefits and other forms of compensation for first and second reenlistment for active and reserve enlisted personnel, (c) completion of the first data collection to assess retention and career decision-making among junior officers, and (d) empirically determining the effects of spouse dissatisfaction, branch preferences, and workload on junior officer career plans.

## PROGRAM ELEMENT OVERVIEW

PE: 63003A AVIATION ADVANCED TECHNOLOGY  
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
 DoD ORGANIZATION: ARMY  
 FUNDING: FY90 \$ 4.0M (FY91 PRESIDENT'S BUDGET)  
 FY91 \$ 3.9M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to provide for the advanced development, integration, and demonstration of full-scale technology components and subsystems.

Modern Army aircraft face an awesome array of air defense threats which include: (a) optically and radar-equipped 23mm and 30mm air defense guns, (b) SA-11, -13, and -14 infrared and radar-guided missiles, and (c) potential nuclear/biological/chemical and laser threats directed and delivered both from the ground and air vehicles. As a result, the aircraft must possess improved mobility, agility, firepower, and inherent features to include durability and sustainability for extended periods of combat at an affordable cost. Army aircraft must be durable, damage-tolerant, easy to repair and maintain, and possess the highest level of availability possible. The application of fiber-optic technology to flight control components, advanced rotor technology to existing and proposed rotor systems, as well as the development of advanced weapons and fire control, advanced engines and drive trains, advanced simulation technology and advanced avionics are the keys to providing reliable, survivable Army aircraft essential to the future integrated battlefield. These demonstration programs represent investments in technology to maximize Army aviation's future capability to perform its combat mission. Emphasis is placed on: (a) ballistically-tolerant material, (b) electronic hardware to enable day/night, adverse weather aviation operations (avionics), (c) advanced propulsion systems (engine and drive train) for improved mobility, agility, reduced weight/cost and fuel consumption, and (d) advanced flight controls for reduced weight and cost, improved survivability, reduced pilot workload, and initial training requirements.

The efforts to be accomplished under this Program Element will be a significant part of the technology base for establishing criteria and specification for block improvements to the existing fleet, as well as providing the needed technology for the next generation Army aircraft of the mid-to-late 1990s and beyond. Selected near-term advances may be applied to aircraft, such as the UH-60 Blackhawk and AH-64 Apache, as block improvements. This program provides the technology thrusts that are essential if Army aviation is to continue to effectively contribute to the Air-Land Battle of the 1990s and into the 21st century. A major thrust of this program is the demonstration of an integrated cockpit utilizing advanced simulation technology, advanced flight controls, improved handling qualities, avionics, weaponization, and power plants, all of which are required to improve aircraft effectiveness and survivability.

This Program Element also supports the Integrated High Performance Turbine Engine Technology (HPTET) Program Department of Defense (DoD), National Aeronautics and Space Administration (NASA), and Defense Advanced Research Projects Agency (DARPA) initiative to support the development of technology for aircraft and missile power plants. The goal of this program is to demonstrate technology around the turn of the century which would double current propulsion system capability for a wide range of potential aircraft and missile applications. These demonstration programs represent investments in technology to maximize Army aviation's future capability to perform its combat mission.

The work in this Program Element is consistent with the Army's resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives (STOs) milestones for the Army's key emerging technologies and Advanced Technology Transition Demonstrations (ATTDs) are funded on a priority basis.

The in-house developers of the technology under this Program Element include: Project Manager for Training Devices (PM TRADE), U.S. Army Aviation Systems Command (AVSCOM), Avionics R&D Activity, Aviation Research and Technology Activity, Aerostructures Directorate, Aeroflightdynamics Directorate, Propulsion Directorate, Aviation Applied Technology Directorate, with work related activities also performed by the National Aeronautics and Space Administration (NASA).

#### RELATED ACTIVITIES:

Close liaison is maintained with other Services, other Army laboratories, and industry to ensure there is no duplication of effort. As part of that coordination, the Army participates in the Department of Defense Tri-Service Joint Technical Coordination Group for Munitions Development; Acoustical Society of American Standards, Committee on Acoustics and Noise, Air Standardization Coordination Committee, Working Party 10; Advisory Group for Aerospace Research and Development; and the Military Agency for Standardization, Aircraft Instruments and Aircrew Stations Working Group, North Atlantic Treaty Organization Air Armament Working Party and the Air Standardization Coordinating Committee of NATO.

The technical information and determination are for joint use and standardization of airborne weaponization items. The Army Development Committee (AMRAD), an organization within the Office of the Secretary of Defense, functions to establish joint-Service requirements and the development of air munitions.

Related concept exploration is conducted under Program Element #0602211A (Aviation Technology) and full scale development under Program Element #0604801A (Aviation Engineering Development) and #0604202A (Aircraft Weapons). An important element of the coordination on-going is the Memorandum of Agreement (MOA) which exists with the Air Force between the US Avionics R&D Activity (AVRADA) and Air Force Wright Aeronautical Laboratories. Under that MOA, AVRADA is responsible for participation as an active member in the Integrated Communications, Navigation and Identification Avionics Program (ICNIA).

#### PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved aircraft mobility, agility, firepower, and inherent features to include durability and sustainability for extended periods of combat at an affordable cost.

Army aircraft will be durable, damage tolerant, easy to repair and maintain, and possess the highest level of availability possible. The application of fiber-optic technology to flight control components, and advanced rotor technology to existing and proposed rotor systems, as well as the development of advanced weapons and fire control, advanced engines and drive trains, advanced simulation technology and advanced avionics are the keys to providing reliable, survivable Army aircraft essential to the future integrated battlefield.

#### FUTURE DIRECTIONS:

The efforts to be accomplished under this Program Element will be a significant part of the technology base for the next-generation Army aircraft of the mid-to-late 1990s and beyond.

In FY91, plans for the Rotorcraft System Integration Simulator (RSIS) Project

include: (a) development of the extended field-of-regard system for the motion simulator, and (b) integration of simulation capabilities with the Crew Station Research and Development Facility.

In FY91, plans for the Flight Simulator Components Project include initial rapidly reconfigurable database capability established together with a standard transform enabling users to access the tri-Service standard simulator database.

## PROJECT OVERVIEW

		90	91
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PROJECT: DB34	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)	\$ 3.1M	\$ 3.0M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY AVIATION SYSTEMS COMMAND		

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PROJECT SYNOPSIS:

The objective of this Project is to develop an advanced rotary winged aircraft simulator facility by expanding the capabilities of the National Aeronautics and Space Administration's (NASA's) Vertical Motion Simulator (VMS) in order to reduce costs and development time on new rotorcraft.

In FY90 it is planned to: (a) continue the visual system improvements and development of the extended visual system database, and (b) complete enhancement of the attack helicopter high-fidelity simulation capability.

In FY91 it is planned to: (a) complete the development of the extended field-of-regard system for the motion simulator, and (b) integrate the enhanced integrate simulation capabilities with the Crew Station Research and Development Facility.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) detailed evaluation of engineering concepts before a commitment to aircraft hardware, (b) compressed development time, and (c) reduced cost.

In FY89, specific accomplishments included: (a) completed the development of the Advanced Cab and Visual System and initiated integration on the advance Vertical Motion System, (b) initiation of the upgrade of the motion systems visual field-of-view to upgrade the total Vertical Motion Simulator, and (c) continuing development of the AH-64 math model and development of the extended visual system database for simulation.

## PROJECT OVERVIEW

		90	91
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PROJECT: DB39	FLIGHT SIMULATOR COMPONENTS	\$ 0.9M	\$ 0.9M
PE: 63003A	AVIATION ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to develop and demonstrate advanced flight simulation techniques and components for incorporation into the design of future simulators and for improving training capabilities of current simulators.

In FY90, plans include to initiate the technology development for a system to rapidly reconfigure computer-generated imagery. This system could be used to improve proficiency of Army aviators and combat vehicle crews.

In FY91, plans include to establish an initial rapidly reconfigurable database capability together with standard transform enabling users to access a tri-Service standard simulator database.

## PAYOFF/UTILIZATION:

The payoff of this Project includes development of visual simulation components designed to provide full mission training capability for NOE flight, navigation, gunnery, and survivability in a combat environment.

These devices will enhance the navigational and target recognition and acquisition skills of rotorcraft system crews, increasing Army aviation combat readiness and proficiency. Visual technology developed in this program will be applied to all air and ground based simulators to improve training quality and reduce training and acquisition costs.

In FY89, specific accomplishments included completion of incorporation of Ada computer language on Army flight simulator for demonstration and evaluation of real time simulation in the Ada programming environment.

## PROGRAM ELEMENT OVERVIEW

PE: 63007A HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL  
HUMAN FACTORS  
EDUCATION & TRAINING  
SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: ARMY

FUNDING: FY90 \$ 18.9M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 18.7M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to focus advanced technology efforts in four areas of soldier performance by: (a) using human factors in the design of new systems, (b) using improved, theory-based education and training techniques exploiting modern computers, (c) using research and development of design alternatives for lower cost, less complex simulators and training devices, and (d) using scientifically sound methods for recruiting, selecting and retaining manpower to better match supply and demand.

The work in this Program Element is consistent with the Army resource constrained Technology Base Master Plan and force modernization plans. Science and Technology Objectives and advanced technology transition demonstrations (ATTDs) are funded on a priority basis.

The in-house developing organization responsible for Projects A792, A793, A794, and A795 is the Army Research Institute for the Behavioral and Social Sciences (ARI), and for Project A796 is the Army Human Engineering Laboratory (HEL).

## RELATED ACTIVITIES:

Exploratory development efforts related to this Program Element transition from Program Element #0602785A, Manpower, Personnel and Training Technology, and Program Element #0602716A, Human Factors Engineering Technology.

Coordination of Research and Development (R&D) to preclude unwanted duplication of effort is accomplished with the Air Force Human Research Laboratory and the Navy Personnel Research & Development Center. Coordination is also accomplished through annual Department of Defense budget and management reviews and through membership in tri-Service committees such as the Human Factors Technology Coordination Group, the Human Factors Test and Evaluation Subgroup, and the DoD/NASA Simulation Working Group. Simulation and training device development is coordinated on a continuing basis directly with the Defense Advanced Research Project Agency (DARPA).

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include advances in all four areas of soldier performance: (a) manpower supply will be better matched to demand, (b) new system designs will incorporate human factors considerations, (c) education and training will become more technology-based, less expensive, and less complex, and (e) simulators and trainers will be developed.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in: (a) developing technology for improving methods of attracting, selecting and assigning the most qualified personnel, and retaining the best performers, (b) developing improved methods for estimating requirements and assessing the impact of human factors, manpower, personnel and training (HMPT) in combat development, and weapon system design, operability and maintainability, (c) developing alternative methods for cost-effective application of computers and related electronic technology to training, (d) designing lower-cost, lower-complexity simulators and training devices, (e) capitalizing on the results of human factors engineering exploratory development efforts by transitioning the the efforts into the development of, and proof of concept for, methods, models, analysis tools, techniques, design guidelines, and nonsystem specific technology demonstrators for human factors engineering integration throughout the combat development and weapon system design phases.



## PROJECT OVERVIEW

		90	91
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PROJECT: A792	MANPOWER AND PERSONNEL	\$ 6.3M	\$ 5.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project include developing and evaluating methods of: (a) attracting personnel, (b) selecting the most qualified, (c) assigning them to Military Occupational Specialties (MOS) that capitalize on their aptitudes and vocational interests, and (d) retaining the best performers. The Project also includes a major research and development (R&D) effort to quantify the effect of family factors on readiness and retention, and build a technology for the development of executive-level Army leaders.

In FY90, plans include: (a) empirically determining and modeling the effects of enlistment motivation, incentives, and skill-training options on enlistment and retention of quality soldiers, (b) developing manpower budget models to simulate the impact of alternative personnel policies on the Army budget, (c) demonstrating a new selection test to screen out applicants with the highest potential for attrition and discipline problems, (d) developing a technology for assessing the effectiveness of mid-level decision-making performance during warfighting and crisis management situations, and (e) determining the quantitative relationship between family factors and soldier readiness.

In FY91, plans include: (a) testing a model of the effects of enlistment motivations, incentives and training options on enlistment and retention of quality soldiers, (b) validating a model for estimating costs of alternative enlisted force structures for different contingency missions under varying levels of soldier quality and demographic characteristics, (c) developing and testing a new methodology to improve the selection of junior non-commissioned officers (NCOs), and (e) developing and testing models of (1) the interrelationships among Army family career decision-making, retention, and unit readiness, and (2) junior officer branch assignment and retention.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved methods and programs to: (a) attract, select, and retain the most qualified personnel for the Army, (b) assign them to military occupational specialties (MOSs) best using their aptitudes and vocational interests, (c) develop the cohesive units and leaders required for combat readiness in the high-technology Army, and (d) identify aggregated future manpower and personnel needs.

In FY89, specific accomplishments included: (a) demonstration of a refined prototype Enlisted Personnel Allocation System (EPAS) for assignment of new recruits, (b) demonstration of econometric supply models to forecast future enlistments to simulate the effects of changes in recruiting resources, for eventual use of recruiting battalions, (c) development of a cost model for the Army College Fund, (d) demonstration of the utility of personal computer (PC)-based models that provide detailed manpower cost estimates at the Military Occupational Specialty (MOS) level for active, reserve and civilian personnel, (e) conducting a worldwide Army family survey to quantify the

relationship of family factors to individual soldier retention decisions, and  
(f) testing cognitive skills assessment techniques for use with students at  
the National and Army War College to increase the efficiency of leader  
development programs.

## PROJECT OVERVIEW

		90	91
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PROJECT: A793	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS	\$ 5.1M	\$ 5.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop and evaluate: (a) improved methods for identifying human factors, manpower, personnel, and training (HMPT) requirements early in the combat development and weapon system development process, (b) improved, empirically-based methods for assessing the impact of HMPT variables on weapon system operability and maintainability, and (c) prototype technologies for integrating soldiers into complex, information-based weapon systems and command, control, communications, and intelligence (C3I) systems.

Modern weapon systems are becoming more lethal, and more complex to operate and maintain on the battlefield. As such, the soldier must be systematically considered throughout the weapon system development and acquisition process.

In FY90, plans include to: (a) developing new crew performance training/evaluation standards for the Forward Area Air Defense (FAAD) system, (b) developing a methodology for including quantified soldier performance issues in weapon system requirements emerging from the Army's Concept Based Requirements System (CBRS), (c) developing improved Manpower and Personnel Integration (MANPRINT) techniques for improved test and evaluation in the weapon system acquisition process, (d) integrating a logistics model with existing manpower, personnel, and training (MPT) requirements estimation method, (e) developing and evaluating new methods for crew coordination training and mission assignment to reduce aviation and ground accidents, and (f) developing tactical planning graphics formats for improved C3I system performance.

In FY91, plans include to: (a) developing an empirically sound analytic method for making cost-benefit trade-offs among performance requirements, personnel availability, training requirements and equipment design, (b) determining the validity of operator/maintainer work load predictors for the Advanced Field Artillery System, the Forward Area Air Defense System, and the Automatic Target Handoff System, (c) evaluating the impact on personnel and training of different maintenance concepts for the Advanced Field Artillery System and the Forward Area Air Defense System Non-Line-of-Site (NLOS) component, (d) developing refined, empirically-based, Manpower and Personnel Integration (MANPRINT) components for improved reliability, availability and maintainability (RAM) analyses, battle damage assessments, and accident prevention, (e) developing a brigade-corps behavioral task model and performance criteria for assessing battlestaff performance, (f) developing the Field Training Exercise (FTX) "lessons learned" database for the Battle Command Training Program, and (g) determining quantitative relationships among weapon system design characteristics, personnel performance and unit performance effectiveness.

PAYOFF/UTILIZATION:

The payoffs of this Project include improved training and operational effectiveness of weapon systems.

In FY89, specific accomplishments included: (a) demonstration of improved methods for the identification of manpower savings available from alternative maintenance concepts for the All Source Analysis System (ASAS), and (b) development of prototypes of improved performance-based methods for estimating manpower, personnel and training (MPT) requirements for new systems.

## PROJECT OVERVIEW

		90	91
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PROJECT: A794	EDUCATION AND TRAINING	\$ 4.2M	\$ 3.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to lead to theory-based training methods that produce more proficient soldiers without an increase in training resources (instructors, time, facilities, and travel).

This Project will experimentally investigate alternative methods for cost-effective application of computers and related electronic technology to training, with emphasis on: (a) individual combat, technical, and maintenance skills, (b) collective crew, team, and unit training, and (c) leadership and unit cohesion.

In FY90, plans include: (a) developing instructional, theory-based guidance for improving the National Training Center after-action reports and take-home unit training packages, (b) developing objective measurement techniques for evaluating unit performance at the Joint Readiness Training Center (JRTC) and the Combat Maneuver Training Complex (CMTC), and (c) developing and demonstrating interactive videodisc methods for transition training.

In FY91 plans include: (a) developing methods and measurement techniques for use by the Army Training and Doctrine Command (TRADOC) to identify training issues and derive "lessons learned" from Joint Readiness Training Center (JRTC) data, and (b) empirically determining relationships of home station training, leadership, and cohesion on unit performance in realistic simulated combat exercises at Combat Training Centers (CTCs).

## PAYOFF/UTILIZATION:

The payoffs of this Project include reductions in training time, costs, facilities and travel while providing equally or more proficient soldiers.

In FY89, specific accomplishments included: (a) empirical determination of the relationship between the amount of tactical training and brigade performance at the National Training Center (NTC), (b) development and demonstration of prototype programs for advanced rifle marksmanship, and (c) design and development of prototype techniques for more objective platoon-level performance measurement at the NTC.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: A795	TRAINING SIMULATION	\$ 2.1M	\$ 2.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY RESEARCH INSTITUTE		

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PROJECT SYNOPSIS:

The objective of this Project is to provide the Army's Training and Doctrine Command (TRADOC) and the Project Manager for Training Devices (PMTRADE) with scientifically-based recommendations for the design of lower-cost, lower-complexity simulators and training devices, focusing on aviation, armor, and maintenance training.

The need for effective simulators and training devices is increasing in order to avoid the high cost of using actual equipment for training and to enable the Army to "train as it will fight".

In FY90, plans include: (a) designing and developing a prototype night vision goggle training system for reserve component units, (b) empirically testing prototype tank gunnery training strategies, using crew and platoon training devices, and (c) developing computer-based tools to aid training device designers in the design of training-effective simulators/training devices at the lowest possible cost.

in FY91, plans include: (a) developing prototype unit training strategies using networked combined arms simulations, and (b) determining tasks appropriate for SIMNET (Simulation Network) training.

## PAYOFF/UTILIZATION:

The payoffs of this Project include to: (a) develop modern simulation and training technologies which can result in significant savings and improvements in flight, maintenance, and tactical training for units in the field, (b) give guidance to TRADOC and PMTRADE on their design of more cost-effective simulators and training devices, and (c) develop alternatives to high-cost, operational systems for training and maintaining the skills of a combat-ready force.

In FY89, specific accomplishments included: (a) development of the prototype tank gunnery training program using state-of-the-art computer generated imagery, and (b) evaluation of the mix of weapons simulators and use of real ammunition for AH-1S helicopter weapons training.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: A796	HUMAN FACTORS ENGINEERING IN SYSTEMS DESIGN	\$ 0.7M	\$ 0.8M
PE: 63007A	HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	ARMY HUMAN ENGINEERING LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to transition results of human factors engineering (HFE) development efforts into the development of, and proof of concept for, methods, models, analysis tools, techniques, design guidelines, and nonsystem specific technology demonstrators for HFE integration throughout the combat development and weapon system design phases.

Rapid changes in technology, combined with increased emphasis on the physiological and associated psychological aspects of soldier-machine interface, i.e., ensuring that Army materiel can be effectively operated by soldiers in the field, have resulted in increasing demands for HFE expertise and the transfer of technology information into the materiel development and acquisition process.

In FY90, plans include the development of an HFE knowledge-based expert system which will assist the human factors engineer in the generation of HFE program requirements for system specifications, statements of work, data item descriptions, and contract data requirements. This expert system will result in more accurate and timely preparation of weapon system design documentation. The Army Manpower and Personnel Integration (MANPRINT) program is geared to considering the soldier throughout the materiel acquisition process. This tool will facilitate the integration of one of the six domains of MANPRINT, i.e., HFE, data into the design of an increased number of weapons systems without additional manpower costs. The first application will be to Army Missile and armor system development programs.

In FY91, plans include: (a) refining the expert system development and expanding the application of the HFE knowledge-based system to other Army materiel development programs, and (b) initiating efforts to expand the system to include the other five domains of MANPRINT (manpower, personnel, training, health hazards, and safety) within the Army. Efforts will also focus on tri-Service coordination and application to Navy and Air Force human factors elements.

## PAYOFF/UTILIZATION:

The payoff of this Project includes the support of all mission areas, and is focused primarily on addressing soldier-machine interactions.

This Project is a new start in FY90, after being deferred under Program Element 63736A.

## PROGRAM ELEMENT OVERVIEW

PE: 64715A                      NON-SYSTEM TRAINING DEVICES - ENGINEERING  
DEVELOPMENT

CONGRESSIONAL CATEGORY:      SIMULATION & TRAINING DEVICES

DoD ORGANIZATION:            ARMY

FUNDING:                      FY90 \$ 16.1M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 41.9M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to provide for engineering development of Non-System Training Devices (NSTD) to support general military training and training on more than one item or system, as compared with system devices that are developed in support of a specific item or system.

Modern weapon systems are being integrated into the force at unprecedented rates, and the Army is faced with increased constraints on people, dollars, time, and real estate in a training environment where ammunition and fuel costs continue to rise. Training devices and training simulation provide force multipliers that can improve combat effectiveness by providing realistic training scenarios while helping to control rapidly escalating costs. Maintaining the combat effectiveness of Army personnel is the key to maintaining a ready force. This combat effectiveness can best be achieved by innovative, efficient, and results-oriented training. The major thrust in development of new training devices is to maximize the transfer of knowledge, skills, and experience from the training situation to a combat situation. Improved training devices, available through modern technology, must continue to be developed to provide the training required to prepare U.S. soldiers to fight and defeat a numerically superior adversary.

The Combined Army Tactical Trainer Program (D574) is not a new start as it was previously programmed within the Procurement Appropriation. The program has been transferred to RDT&E consistent with an Army/audit agency finding concerning Non Developmental Item (NDI) acquisition.

The in-house developing organizations responsible are the Naval Training Systems Center and for Project D573, also the Project Manager for Training Devices.

## RELATED ACTIVITIES:

Program Element #0602727A (Non-System Training Device Technology).

To preclude duplication of effort, this project is closely coordinated with other Services through Training and Personnel Technology Conferences, a Joint Service Technical Coordinating Group, worldwide staffing of Training Device Requirements, and collocation of the Project Manager for Training Devices with the Naval Training Systems Center (NTSC) and the Defense Training and Performance Data Center (TPDC) in Orlando, FL. There is no unnecessary duplication of effort within the Army or the Department of Defense.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include engineering development efforts for a variety of training devices and battle simulation systems which will provide realistic, effective, and economical training in marksmanship, gunnery, air defense, and nuclear, biological, and chemical (NBC) warfare.



FUTURE DIRECTIONS:

Beyond FY91 plans for this Program Element include: (a) continued support for the Project Manager for Training Devices and the Naval Training Systems, and (b) continuing development of: (1) a family of trainers based on proponent requirements with the common element of interoperability on the network and database, and (2) prototype training devices to support combined arms training and multisystem training withing the Army, to include the Reserve Components.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: D241	NON-SYSTEM TRAINING DEVICES COMBINED ARMS	\$ 7.8M	\$21.4M
PE: 64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to develop prototype training devices to support combined arms (Infantry, Armor, Aviation, Air Defense, Artillery, Engineer, Chemical, and support troops) training and multisystem training within the Army, including the Reserve Component.

The purpose of this Project is to improve the effectiveness and efficiency of Army training. This is done by developing training devices which transfer to trainees the knowledge, ability, and experience required to fight outnumbered and win on the modern battlefield (e.g., the Corps Battle Simulation is a command and control system used to train corps commanders, major subordinate commanders, major subordinate elements in the conduct of Deep Operations/Air Land battle operations, and Simulated Area Weapons Effects for Nuclear, Biological and Chemical (NBC) which provides tactical engagement interface with the Multiple Integrated Laser Engagement System, and individual and unit training in various NBC-type environments.) Additionally, this project provides for the development of maintenance simulators such as the Signal Intelligence/Electronic Warfare Maintenance Trainer. This simulator will provide individual training for the maintenance of complex, computer based strategic signal intelligence systems. Devices developed under this project will enable the Army to train the collective unit to obtain the synergistic results which occur when a unit's weapons and support systems are employed in their respective battlefield roles. Utilizing modern technology, these devices will enhance training effectiveness while minimizing the requirements for scarce resources.

In FY90, plans include: (a) completing development of the Air Ground Engagement System II (AGES II), (b) completing development of the Guard Unit Armory Device for Full Crew Interactive Simulation-Armor/Artillery (GUARDFIST), (c) continuing development of the Simulated Area Weapons Effects for Indirect Fire-Global Positioning System (SAWE-GPS), (d) completing development of the Deep Battle Integration Training (DBIT) system, (e) initiating development of the Sigint/EW Maintenance Trainer (SEMT), and continuing development of the Nuclear, Biological, Chemical Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution (PCAS/CADS).

In FY91, plans include: (a) completing development PCAS/CADS, (b) continuing development of the SEMT, (c) initiating development of the Combat Service Support Training Simulation System (CSSISS), and (d) initiating development of the Simulated Area Weapons Effects for Nuclear, Biological, Chemical for Casualty Assessment System (CAS).

## PAYOFF/UTILIZATION:

The payoffs for this Project include: (a) training opportunities with less cost, which are more realistic and meaningful, (b) training conditions, which are safer while still providing high transfer of training to combat

situations, and (c) increased ability to fight and defeat a numerically superior adversary.

In FY89, specific accomplishments included: (a) completion of the development of the Simulated Area Weapons Effects for Mine Effects Simulator (SAWE-MES). (b) continued development of the Guard Unit Armory Device for Full Crew Interactive Simulation-Armor/Artillery (GUARDFIST), (c) continued development of the Deep Battle Integration Training (DBIT) system, (d) continued development of the Air Ground Engagement System II (AGES II), (e) completion of the development of the Simulated Area Weapons Effects for Indirect Fire-Radio Frequency (SAWE-RF), (f) initiation of the development of the Nuclear, Biological Chemical Persistent Chemical Agent Simulant/Chemical Agent Disclosure Solution (PCAS/CADS), and (g) initiation of the development of the Simulated Area Weapons Effects for Indirect Fire-Global Positioning System (SAEW-GPS).

## PROJECT OVERVIEW

		90	91
		-----	-----
PROJECT: D573	PROJECT MANAGER FOR TRAINING DEVICES AND NAVAL TRAINING SYSTEMS CENTER SUPPORT	\$ 8.3M	\$ 8.9M
PE: 64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the support of Project Manager for Training Devices (PMTRADE) personnel and to fund a proportionate Army share of the operating costs of the Naval Training Systems Center (NTSC) through an Inter-Service Support Agreement which is reviewed annually.

In FY90/91, it is planned to continue funding PMTRADE personnel and NTSC support.

## PAYOFF/UTILIZATION:

The payoff of this Project is that this arrangement makes available all Naval Training Systems Center (NTSC) resources for Army use.

These resources include: (a) over 800 civilian employees, of which almost 40 percent are professional personnel specializing in research, development, and training technology, and (b) extensive simulation facilities, including laboratories in areas such as physical sciences, electronics, visual simulation, computers, and human factors. Thus, the PMTRADE, collocated at NTSC with a limited number of Army personnel, performs a mission for the Army in the training area similar to those of development commands in other areas. Also, it includes contractual services for support which NTSC cannot provide due to manpower constraints.

FY89 accomplishments included funding support of PMTRADE personnel and a proportionate Army share of the operating costs of NTSC.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: D574	COMBINED ARMS TACTICAL TRAINER	\$ 0.0M	\$11.5M
PE: 64715A	NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to develop the Combined Arms Tactical Trainer (CATT) concept. This simulated environment selectively emulates equipment capabilities and establishes an environment which gives maneuver forces the opportunity to practice the art of synchronizing all applications of combat power without regard for peacetime restrictions of environment, economics, or safety. It further envisions a training strategy in which units can conduct training at the home station between field exercises.

The Army will not buy CATT. It will buy a family of trainers based on proponent requirements. The common element will be interoperability on the network and database. Thus, helicopter modules at Fort Rucker will be able to operate, via long-haul network, with tank and Bradley modules at Fort Knox or Grafenwoehr. These trainers will allow soldiers to practice repetitively, techniques which, if performed on real equipment, would be too hazardous, time-consuming, and expensive. These trainers enhance training realism and allow soldiers and units to learn tactical combat lessons on maneuver, command and control, and how to shoot without being killed, lessons heretofore learned only at the cost of soldiers' lives.

The first two trainers in the CATT series are the Close Combat Tactical Trainer (CCTT) and the Aviation Combined Arms Tactical Trainer (AVCATT). Others will be added as proponents define their requirements.

This Project is not a new start as it was previously programmed within the procurement appropriation. An Army Audit Agency finding determined that and NDI Integration Strategy is inappropriate. In addition, the significance of the changes in the requirements documents necessitate an RDT&E effort. Procurement funds have been transferred to perform the effort.

In FY90, plans include performing the in-house effort leading to a full scale engineering development contract award in FY91.

In FY91, plans include initiating full scale engineering development.

## RELATED ACTIVITIES:

To preclude duplication of effort, this Project is closely coordinated with other Services through Training and Personnel Technology Conferences, a Joint Service Technical Coordinating Group, worldwide staffing of Training Device Requirements, and collocation of the Project Manager for Training Devices with the Naval Training Systems Center and the Defense Training and Performance Data Center in Orlando, FL. There is no unnecessary duplication of effort within the Army or the Department of Defense.

PAYOFF/UTILIZATION:

The payoff of this Project is the development of the Combined Arms Tactical Trainer (CATT) concept which envisions a training environment where all the elements of the combined arms battlefield can be simulated and exercised at one time.

FY89 accomplishments included the completion of the Defense Advanced Research Projects Agency (DARPA) proof-of-principle.

## PROGRAM ELEMENT OVERVIEW

PE: 64801A AVIATION ENGINEERING DEVELOPMENT  
CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: ARMY  
  
FUNDING: FY90 \$ 10.6M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 14.3M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to support aviation engineering developments associated with Synthetic Flight Training Systems (SFTS), Aviation Life Support Equipment (ALSE), and Aviation Non-Systems Training Devices.

SFTS is a project that supports development of a family of high-fidelity flight, weapon, and mission helicopter simulators to support initial entry helicopter pilot training, transition training, and combat operational training.

ALSE makes the integrated battlefield survivability possible, and emphasizes enhancing the air crews' ability to return to fight again, through new protective clothing ensembles, aviator protective masks, laser protective visors, survival kits, restraint systems, integrated flight helmets, and microclimate cooling devices.

The Aviation Non-System Training Devices Project supports development of aviation training devices that are applicable to more than one aviation system.

The in-house engineering development work is lead by the Defense Advanced Research Projects Agency.

## RELATED ACTIVITIES:

Aviation Life Support Equipment programs are coordinated through several tri-Service and allied working groups and steering committees; appropriate Army, Air Force, and Navy development commands; and aircraft PMs in order to prevent duplication of effort and ensure proper priority of efforts. For coordination of training device technology with the Air Force and the Navy, the Army Project Manager for Training Devices is located at the Naval Training Systems Center and has an Air Force liaison officer. Program Elements 0603003A (Aviation Advanced Technology) and 0602727A (Non-System Training Devices Technology) perform flight simulation component research and development. Many joint projects are effected between the Services to prevent duplication of in-flight simulator development efforts.

## PAYOFF/UTILIZATION:

The payoffs of the Training portion of this Program Element include: (a) a reduction in operations and support cost, and (b) a better-trained pilot.

The simulators are used to complement the training accomplished in actual aircraft during formal courses of instruction and for maintenance of combat readiness by rated aviators.

FUTURE DIRECTIONS:

Beyond FY91, plans for the Synthetic Flight Training System Project include continuing flight simulator upgrades to ensure the same configuration as operational aircraft.

In FY91, plans for the Aviation Non-System Training Devices Project include completing full-scale engineering development on the Aviation Network (AIRNET).



## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: D275	SYNTHETIC FLIGHT TRAINING SYSTEMS	\$ 4.6M	\$ 3.9M
PE: 64801A	AVIATION ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to support development of a family of high-fidelity flight, weapon and mission helicopter simulators to support initial entry helicopter pilot training, transition training, and combat operational training.

In FY90, it is planned to: (a) continue flight simulator upgrades to ensure the same configuration as operational aircraft, and (b) begin full-scale development (COBRA and CH-47).

In FY91, it is planned to continue flight simulator upgrades to ensure the same configuration as operational aircraft (UH-60).

## PAYOFF/UTILIZATION:

The payoff of this Project is considerable cost savings utilizing a family of high-fidelity flight and helicopter simulators.

In FY89, specific accomplishments included initiation of a definition of configuration change requirements.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: DE70	AVIATION NON-SYSTEM TRAINING DEVICES	\$ 6.0M	\$10.3M
PE: 64801A	AVIATION ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	ARMY		
RESPONSIBLE ORGANIZATION:	PROJECT MANAGER FOR TRAINING DEVICES		

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PROJECT SYNOPSIS:

The objective of this Project is to develop aviation training devices that are applicable to more than one aviation system.

During the FY88-FY91 timeframe, this Project continues and completes full-scale engineering development of AIRNET. AIRNET is the DARPA "proof-of-principle" Project which provides the framework for the objective system called Aviation Combined Arms Tactical Trainer (AVCATT). AIRNET provides a means to explore and rapidly receive feedback on developmental/doctrinal issues, including: air-to-air testing, human factors engineering, systems integration, cockpit configuration, LHX development, scout/attack mix, warfighting model evaluation, and weapons systems development. Additionally, AIRNET will provide a viable developmental and testing vehicle to aid in the timely acquisition and fielding of future aircraft systems. AIRNET will also provide a means by which the Army can evaluate and adapt current and future doctrine to meet an ever-changing threat environment.

In FY90 plans are to continue full-scale engineering development on AIRNET.

In FY91 plans are to complete full-scale engineering development on AIRNET.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) capabilities for improved team training and (b) growth capabilities for future weapons systems as a result of using a modular approach in development.

In FY89, specific accomplishments included continued full-scale engineering development of the Aviation Network (AIRNET).

III-A-1: LISTING OF ARMY PROJECTS

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	6.602	6.300

(CONTINUED)

### III-A-1: LISTING OF ARMY PROJECTS

(CONTINUED)

III-A-1: LISTING OF ARMY PROJECTS

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-HF	ARI	1.935	1.981	HF	4	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A790-ST	ARI	2.230	2.297	ST	6	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-ET	ARI	3.235	3.221	ET	6	MANPOWER, PERSONNEL AND TRAINING
A791-HF	ARI	3.302	3.315	HF	6	MANPOWER, PERSONNEL AND TRAINING
A791-MP	ARI	4.170	4.133	MP	2	MANPOWER, PERSONNEL AND TRAINING
A791-ST	ARI	2.102	2.175	ST	6	MANPOWER, PERSONNEL AND TRAINING
		----- 16.975	----- 17.122			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	16.974	17.122

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63003A						AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	3.094	3.005	ST	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	0.854	0.866	ST	6	FLIGHT SIMULATOR COMPONENTS
		----- 3.949	----- 3.872			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63003A :						FY90      FY91 ----- THE PRESIDENT'S BUDGET, JANUARY 1990    3.948    3.871

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	6.301	5.798	MP	2	MANPOWER AND PERSONNEL
A793	ARI	5.138	5.819	HF	4	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
A794	ARI	4.146	3.800	ET	6	EDUCATION AND TRAINING
A795	ARI	2.115	2.822	ST	6	TRAINING SIMULATION
A796	HEL	0.700	0.750	HF	4	HUMAN FACTORS ENGINEERING IN SYSTEMS DESIGN
		----- 18.401	----- 18.990			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						FY90 ----- 18.896
THE PRESIDENT'S BUDGET, JANUARY 1990						FY91 ----- 18.737

(CONTINUED)



(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT
D241	PMTRADE	7.790	21.418	ST	6	NON-SYSTEM TRAINING DEVICES COMBINED ARMS
D573	PMTRADE	8.334	8.934	ST	6B	PROJECT MANAGER FOR TRAINING DEVICES AND NAVAL TRAINING SYSTEMS CENTER SUPPORT
D574	PMTRADE	0.000	11.500	ST	6F	COMBINED ARMS TACTICAL TRAINER
		-----	-----			
		16.125	41.853			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64715A :						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						16.124
						-----
						41.852

(CONTINUED)

(CONTINUATION)

III-A-1: LISTING OF ARMY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64801A						AVIATION ENGINEERING DEVELOPMENT
D275	PMTRADE	4.576	3.927	ST	6D	SYNTHETIC FLIGHT TRAINING SYSTEMS
DE70	PMTRADE	6.039	10.333	ST	6D	AVIATION NON-SYSTEM TRAINING DEVICES
		----- 10.616	----- 14.260			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64801A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	----- 10.615	----- 14.260

### III.B. NAVY PROGRAM ELEMENT AND PROJECT SYNOPSES

PE	TITLE	PAGE
61153N	DEFENSE RESEARCH SCIENCES	III-B-1
62131M	MARINE CORPS LANDING FORCE TECHNOLOGY	III-B-6
62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	III-B-8
62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA	III-B-16
63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT	III-B-21
63707N	MANPOWER AND PERSONNEL SYSTEMS	III-B-24
63720N	EDUCATION AND TRAINING	III-B-26
63732M	ADVANCED MANPOWER TRAINING SYSTEMS	III-B-28
63733N	SIMULATION AND TRAINING DEVICES TECHNOLOGY	III-B-30
64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	III-B-32
64715N	SURFACE WARFARE TRAINING	III-B-34

Table III-B-1: Listing of Projects - Lists projects for each NAVY program element. Lists contain performing organization, funding, Congressional Category and goal information.

## PROGRAM ELEMENT OVERVIEW

PE: 61153N                      DEFENSE RESEARCH SCIENCES, SUBELEMENT 42:  
                                  COGNITIVE AND NEURAL SCIENCES

CONGRESSIONAL CATEGORY:      EDUCATION & TRAINING  
                                  HUMAN FACTORS  
                                  MANPOWER & PERSONNEL

DoD ORGANIZATION:              NAVY

FUNDING:                        FY90 \$ 12.5M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 13.5M (FY91 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to sustain U.S. Naval scientific and technological superiority for the maintenance of naval power and national security.

The Program includes theoretical and experimental research in selected areas of the physical, mathematical, engineering, environmental, behavioral and life sciences.

The objectives of the MPT Subelement are to develop fundamental knowledge about human capabilities and characteristics, which support and guide Navy and Marine Corps efforts to improve: (a) personnel selection and classification, (b) training, (c) equipment design for ease of human use and maintenance, (d) team composition, (e) leadership, and (f) group decision-making procedures.

Major areas are: (a) Personnel and Training, which includes research on: (1) psychological measurement for selection, classification, and training, (2) human learning and instructional processes, and (3) the cognitive and neural bases of skill and knowledge acquisition, (b) Engineering Psychology, which covers research on basic human performance (such as inference, judgment, decision-making, auditory and visual perception, and system control) and on factors underlying the design of human-compatible interfaces in high technology systems, and (c) Group Psychology, which focuses on group processes, group behavior, leadership, and other factors that determine the productivity, morale, and retention of personnel. Research approaches include theoretical formulations, laboratory and simulator experimentation, mathematical modeling, correlational analyses, and observation and measurement in operational settings.

This Program continues to support: (a) the ONR Graduate Fellowship Program, (b) the ONR High School Apprenticeship Program, (c) the Historically Black Colleges/Universities Program, (d) programs designed to increase scientific manpower trained in areas critical to Naval research, and (e) the Summer Faculty Program, which brings academic scientists into Navy laboratories to better couple Navy laboratory and university research.

## RELATED ACTIVITIES:

Coordination is maintained through: (a) reviews by the Assistant Secretary of Defense for Research and Technology, (b) active Navy and Marine Corps participation in inter-service and interagency committees, and (c) interaction with the scientific community.

## PAYOFF/UTILIZATION:

The payoffs of this Subelement include research support for: (a) advanced training technology by the Navy training community, (b) operational

man-machine systems, and (c) manpower and personnel policies and practices which affect recruitment, retention, and productivity.

This research effort is the primary means for determining scientific understanding and the needed technologies underlying improvements in Navy capabilities and operations. Increased research is needed to reach technological parity in some areas and gain/maintain superiority in others. Research is directed to search out, assess, and exploit potential solutions to Naval problems.

FUTURE DIRECTIONS:

This is a continuing Program.

## PROJECT OVERVIEW

		90	91
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PROJECT: RR04206	PERSONNEL AND TRAINING	\$ 6.9M	\$ 7.4M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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PROJECT SYNOPSIS:

The objective of this Project is to begin theoretical work toward estimating complex abilities from multidimensional tests.

Cognitive processes research will emphasize dynamic changes in knowledge representation as a novice learner progresses toward expert level skill, and learning and training research will begin to include social and motivational factors in transitioning from traditional classroom instruction to learning environments with advanced technologies such as intelligent tutor systems.

## PAYOFF/UTILIZATION:

The payoff of this Project includes the solution of many training problems in the Navy through the introduction of more individualized, automated, and simulator-based instruction.

## PROJECT OVERVIEW

		90	91
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PROJECT: RR04208	GROUP PSYCHOLOGY	\$ 3.0M	\$ 3.2M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONCIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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## PROJECT SYNOPSIS:

The objective of this Project is to increase understanding of the psychological and organizational variables that determine the performance of individuals, groups, teams, and units in the Navy and Marine Corps.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved quality of Navy and Marine Corps personnel, reduction of personnel attrition and losses of Petty Officers in shortage categories, and enhanced effectiveness of military and civilian employees.

## PROJECT OVERVIEW

		90	91
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PROJECT: RR04209	ENGINEERING PSYCHOLOGY	\$ 2.6M	\$ 2.8M
PE: 61153N	DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	OFFICE OF NAVAL RESEARCH		

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## PROJECT SYNOPSIS:

The objective of this Project is the development of enhanced group decision-making procedures.

## PAYOFF/UTILIZATION:

The payoff of this Project will be improved human performance in high technology systems to meet Navy and Marine Corps operational requirements.



## PROGRAM ELEMENT OVERVIEW

PE: 62131M                      MARINE CORPS LANDING FORCE TECHNOLOGY  
CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
DoD ORGANIZATION:            MC  
  
FUNDING:                      FY90 \$ 0.5M (FY91 PRESIDENT'S BUDGET)  
                                 FY91 \$ 0.6M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element (PE) is to develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel and training management policies and procedures.

This Program Element is the only DoD program that develops the technologies needed to support unique Marine Corps expeditionary force requirements. Mission needs are derived from specific threat capabilities and the requirement to operate in a variety of climates and tactical scenarios worldwide, including the conduct of amphibious operations.

Close coordination is maintained with all the other Armed Services and selected DoD agencies, and industrial research and development programs. There is no duplication of effort.

The Marine Corps Manpower and Training Technology area includes: PE 62722A (Manpower, Personnel and Training), PE 63743A (Education and Training), PE 63732M (Marine Corps Manpower and Training Systems), joint-Service Job Performance Measurements Working Group, Computerized Adaptive Testing Interservice Coordinating Committee, and PE 62233N (Mission Support Technology).

The in-house work is performed by the Naval Ocean Systems Center, Naval Coastal Systems Center, Naval Surface Warfare Center, David Taylor Research Center, Naval Civil Engineering Laboratory, Naval Weapons Center, Navy Personnel Research and Development Center, and Naval Research Laboratory.

## PAYOFF/UTILIZATION:

The payoffs of the MPT portion of this Program Element are improved utilization and increased readiness of personnel through: (a) more accurate assessment of individual aptitudes and abilities, (b) improved personnel retention, (c) reduced short-term personnel transfers, (d) the development of low-cost training simulators, (e) better training standards from all unit levels, and (f) improved, less manpower-intensive procedures for matching training to job requirements.

## FUTURE DIRECTIONS:

Beyond FY91, in this continuing program, it is planned to continue to pursue manpower management and forecasting technology.

## PROJECT OVERVIEW

		90	91
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PROJECT: CF31P14	MARINE CORPS MANPOWER & TRAINING TECHNOLOGY	\$ 0.5M	\$ 0.6M
PE: 62131M	MARINE CORPS LANDING FORCE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	MC		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Subproject is to develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel management policies and procedures through focusing on: (a) faster, more accurate assessment of individual aptitudes and abilities (a joint-Services project), (b) improvement of personnel retention, and (c) reduction of short-term personnel transfers.

In FY90, it is planned to: (a) continue acceptance testing of tour optimization system, and (b) commence assessment of technology to develop a force manpower management and personnel forecasting system.

In FY91, it is planned to continue to pursue the manpower management and forecasting technology.

## PAYOFF/UTILIZATION:

The payoff of this Subproject is improved utilization of personnel and thus increased readiness through: (a) more accurate assessment of individual aptitudes and abilities, (b) improved personnel retention, and (c) reduced short-term personnel transfers.

In FY89, specific accomplishments included performing of data collection analysis on stress and fatigue-related tasks and their application to military job assignments.

## PROGRAM ELEMENT OVERVIEW

PE: 62233N                      MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING  
AND SIMULATION TECHNOLOGY AREA

CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
EDUCATION & TRAINING  
SIMULATION & TRAINING DEVICES  
HUMAN FACTORS

DoD ORGANIZATION:              NAVY

FUNDING:                        FY90 \$ 8.3M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 10.4M (FY91 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide mission support technologies essential for all naval operations, specifically through the support of effective recruitment, training, and retention of military personnel and the development of training device simulation technology.

The Office of Naval Technology mission area for training systems is concerned with improving the training effectiveness of Navy training devices and lowering their costs. It is also concerned with extending training device applicability into more training domains. The technology that is being developed will enhance visual and sensor simulation capabilities, provide advanced computer hardware and software concepts for greater real-time simulation capabilities, improve the instructional value of simulation systems, and define the necessary functional characteristics of training devices.

The technology developed under the mission area for personnel and training will allow the Navy to maximize the effectiveness of its manpower and personnel systems, and will contribute to the improvement of man-machine interaction and the assessment of fitness for duty in combat system operators.

Personnel and training technologies enhance the Navy's ability to select, assign and train people for highly demanding jobs. Biomedical technologies improve the medical care delivery system and enhance performance capabilities under adverse conditions. Logistics technologies increase operational readiness through effective management and movement of supplies ashore and at-sea, improve fuel procurement specifications, and advance techniques for more cost effective construction and maintenance of shore and off-shore facilities. Environmental protection technologies address Navy-unique issues in air and water quality and toxic waste. Chemical/Biological/Radiological Defense (CBR-D) technologies improve the ability to respond to existing and future CBR-D threats.

There are two new Project starts within this Program Element for FY91: these two Projects support the Tactical Decision-Making Under Stress (TADMUS) program. This is a cooperative program in human factors, managed by the Naval Ocean Systems Center, and training, managed by the Naval Training Systems Center, and will include efforts by other Navy, industrial and academic organizations.

The funding indicated with this Program Element is limited to that which applies to the MPT portion of this Element.

The work within this Program Element is performed by the Naval Air Propulsion Center, Naval Coastal Systems Center, Navy Personnel Research and Development Center, Naval Training Systems Center, Naval Medical Research and Development Command Laboratories, Naval Air Development Center, David Taylor Research Center, Naval Civil Engineering Laboratory, Naval Surface Warfare Center,

Naval Research Laboratory, and the Naval Ocean Systems Center.

RELATED ACTIVITIES:

Efforts are in consonance with progress in other Services and are coordinated through informal exchanges of information as well as formal Technical Advisory Groups, Working Groups, Committees, joint Memoranda of Understanding and/or joint-Service Agreements. Also, Program Elements 63733N, Simulation and Training Devices; 64714N, Air Warfare Training Devices; 64715N, Surface Warfare Training Devices.

PAYOFF/UTILIZATION:

The payoffs of the MPT portion of this Program Element are more effective recruitment, training, and retention of military personnel.

FUTURE DIRECTIONS:

Plans for FY91 under this Program Element include to: (a) develop improved ASW training capability by means of real-time acoustic simulation techniques, (b) complete evaluation of a prototype network to deliver training to Navy personnel geographically remote from instructional facilities, (c) complete all computer assisted diagnostic programs for use in submarine environments, and (d) initiate field evaluation of mission-specific performance enhancement interventions.

## PROJECT OVERVIEW

	90	91
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PROJECT: RM33D40	TACTICAL DECISION-MAKING \$ 0.8M \$ 1.9M UNDER STRESS (TADMUS)	
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	NAVY	
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER	

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PROJECT SYNOPSIS:

The objective of the Tactical Decision-Making Under Stress (TADMUS) program is to apply recent developments in decision theory, individual and team training, and information display to the problem of enhancing tactical decision quality under conditions of stress.

This program will be accomplished by a cooperative program in human factors and training. The technology will be demonstrated and evaluated in the context of anti-air scenarios and general principles will be developed that will be applicable to other warfare areas.

The objectives of the program will be accomplished through the following interrelated tasks: (a) task definition and measurement, (b) examination of stress effects on decision-making, (c) development of decision support principles, (d) development of training and simulation principles, and (e) development of display principles.

The Naval Ocean Systems Center and the Naval Training Systems Center will accomplish the tasks cooperatively, with both laboratories involved in all of the tasks to some extent.

This Project will be managed by the Naval Training Systems Center and is principally concerned with development of training and simulation principles to counteract stress.

## PAYOFF/UTILIZATION:

The payoffs of this Project are the enhancement of tactical decision quality under conditions of stress through the application of recent developments in decision theory, individual and team training, and information display.

This Project is a new start in FY90.

## PROJECT OVERVIEW

		90	91
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PROJECT: RM33D60	TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)	\$ 0.8M	\$ 1.9M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of the Tactical Decision-Making Under Stress (TADMUS) program is to apply recent developments in decision theory, individual and team training, and information display to the problem of enhancing tactical decision quality under conditions of stress.

This program will be accomplished by a cooperative program in human factors and training. The technology will be demonstrated and evaluated in the context of anti-air scenarios and general principles will be developed that will be applicable to other warfare areas.

The objectives of the program will be accomplished through the following interrelated tasks: (a) task definition and measurement, (b) examination of stress effects on decision-making, (c) development of decision support principles, (d) development of training and simulation principles, and (e) development of display principles.

The Naval Ocean Systems Center and the Naval Training Systems Center will accomplish the tasks cooperatively, with both laboratories involved in all of the tasks to some extent.

This Project will be managed by the Naval Ocean Systems Center and is principally concerned with development of decision support principles and display principles for decision support systems.

## PAYOFF/UTILIZATION:

The payoffs of this Project are the enhancement of tactical decision quality under conditions of stress through the application of recent developments in decision theory, individual and team training, and information display.

This Project is a new start in FY90.

## PROJECT OVERVIEW

		90	91
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PROJECT: RM33M20	MANPOWER AND PERSONNEL TECHNOLOGY	\$ 2.9M	\$ 2.9M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Subproject is to: (a) improve accessioning and recruiting techniques, (b) improve the quality and retention of personnel, (c) improve the fit between personnel and jobs, (d) enhance the motivation and productivity of personnel, and (e) increase the effectiveness of managers and policy makers by giving them better tools for measuring and predicting the consequences of their decisions.

This project provides for the efficient means of locating, recruiting, assigning, and managing all manpower resources within the Navy. It includes recruiting strategies and techniques, developing new personnel assessment procedures, improving assignment and retention systems, developing procedures to motivate and utilize personnel, improving management feedback systems, and developing new force management techniques. The performance gains from effectively selecting, assigning, and utilizing personnel are substantial when one considers that attrition losses alone cost the Navy tens of millions of dollars per year.

In FY90 it is planned to improve the calibration techniques for computer-administered test items used to select and assign applicants for military service.

In FY91 it is planned to initiate field evaluation of mission-specific performance enhancement interventions developed for the Naval special warfare community.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved recruitment and retention of military personnel.

In FY89, accomplishments included completing the development of measures which predict officer leadership abilities, for use in selecting Naval Academy midshipmen.

## PROJECT OVERVIEW

		90	91
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PROJECT: RM33T21	INSTRUCTIONAL TECHNOLOGY	\$ 1.2M	\$ 1.1M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objectives of this Project are to improve the Navy's ability to train personnel effectively, rapidly, and economically.

These objectives will be met by developing state-of-the-art technology for:  
(a) computer-based intelligent training systems, (b) communication and problem solving skills, (c) individual and group performance measurement, and (d) cost-effective simulators and training devices.

In FY90 it is planned to complete the evaluation of techniques for training and evaluating the performance of Naval combat teams.

In FY91 it is planned to complete all computer assisted diagnostic programs for use in submarine environments.

## PAYOFF/UTILIZATION:

The payoffs of this Project will be training for Navy personnel that is cost-effective, expedient and efficient, and the development of state-of-the-art technology in several training areas.



## PROJECT OVERVIEW

		90	91
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PROJECT: RM33T23	TRAINING SYSTEMS TECHNOLOGY	\$ 1.4M	\$ 1.4M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to support effective training of Navy personnel.

The Training Systems Project explores how new technology can be brought to bear on reducing the personnel intensive character of Navy training. This is important because personnel costs continue to be a major cost, and are becoming an increasingly scarce resource. Knowledge-based expert systems, computer networking, artificial intelligence, computer controlled video and graphics, and techniques for training that maintain trainee skills over time, are being explored for their potential in raising training productivity.

In FY91, it is planned to complete evaluation of a prototype network to deliver training to Navy personnel geographically remote from instructional facilities (e.g., shipboard training, training of reservists).

## PAYOFF/UTILIZATION:

The payoffs of this Project include more effective training of military personnel.

In FY89, specific accomplishments included the completion of the evaluation of artificial intelligence applications to a maintenance training course for the SH-3H helicopter.

## PROJECT OVERVIEW

		90	91
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PROJECT: RM33T24	SIMULATION TECHNOLOGY	\$ 1.2M	\$ 1.2M
PE: 62233N	MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objectives of this Project are to develop and demonstrate the feasibility of technologies for improving the training effectiveness and reducing the cost of simulation systems in training devices.

This Project is concerned with developing a simulation capability for evolving weapons and sensors, expanding simulation into training areas that are presently performed on operational equipment, and developing improvements to existing training device technology to provide expanded capabilities and lower costs. The efforts encompass investigations into new simulation capabilities in the areas of visual simulation, sensor simulation and the simulation of specialized training environments in support of all warfare areas.

In FY90 plans are to develop prototype multi-element optical waveguide sensors.

In FY91 plans are to develop improved Anti-Submarine Warfare (ASW) training capability by means of real-time acoustic simulation techniques to depict range-dependent effects such as those produced by temperature differences and changes in bottom depth.

## PAYOFF/UTILIZATION:

The payoffs of this Project include more effective training of military personnel through the provision of advanced training simulation devices.

In FY88, specific accomplishments included completing the development of simulation techniques for training Inverse Synthetic Aperture Radar (ISAR) target recognition skills.

## PROGRAM ELEMENT OVERVIEW

PE: 62234N                      SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS  
TECHNOLOGY AREA

CONGRESSIONAL CATEGORY:      HUMAN FACTORS

DoD ORGANIZATION:            NAVY

FUNDING:                      FY90 \$ 4.4M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 4.2M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide Navy systems developers with the resources and expertise to implement advanced concepts, specifically in the areas of man-machine interface, decision-making, and information transfer.

This Program Element comprises a broad technology base program to provide the Navy with the capability, resources, and expertise to implement advanced weapon system concepts. The materials and electronic devices topics address fundamental limitations in terms of performance, reliability and cost in order to accelerate transition of advanced technology to fleet use. Computer Technology addresses hardware and software development issues and supports advanced concepts in Artificial Intelligence technology. The Human Factors topic addresses high-payoff technological opportunities in man-machine interface, decision making and information transfer.

The Biopsychometric Assessment Project will address human performance limitations such as failure to detect, identify, classify and appropriately respond to enemy targets by developing technologies for assessing real time operator performance using direct brain processing techniques. It seeks to develop a methodology to predict operator failure and thereby minimize operator error.

Funding indicated in this Program Element includes only the MPT portion of the Program Element.

The work is being performed at the Naval Civil Engineering Lab, David Taylor Research Center, Naval Air Development Center, Naval Air Propulsion Center, Naval Ocean Systems Center, Naval Research Lab, Naval Surface Warfare Center, Naval Weapons Center, and Naval Avionics Center.

## RELATED ACTIVITIES:

This program works closely with the Program Elements 602111N (AAW/ASW Technology) and 0603270N (Electronic Warfare Technology) to provide needed experimental sensor devices, power sources, and special processing chips. The materials efforts are closely coordinated with Program Elements 0602121N (Surface Ship Technology), 0602122N (Aircraft Technology) and 0602323N (Submarine Technology), and provide an array of new structural materials to satisfy new mission requirements. Computer Technology is closely coordinated with Program Elements 0602232N (Command, Control and Communications Technology), 0602111N, 0603270N and 0602314N (ASW Technology). A significant cooperative effort is being jointly pursued with PE 0603792N (Advanced Technology Transition) to develop Ultra-Low Loss Fiber Optic cables for Anti-Submarine Warfare applications.

## PAYOFF/UTILIZATION:

The payoff of the MPT portion of this Program Element is the provision to Navy systems developers of resources and expertise in the areas of

man-machine interface, decision-making, and the development of training and simulation principles, thus enabling improved system design with better utilization of the human component.

In FY89, specific accomplishments included: (a) demonstration of an integrated software environment, and (b) completion of a laboratory evaluation of a decision support system.

FUTURE DIRECTIONS:

Beyond FY91, it is planned to: (a) continue efforts in the development of decision support principles, (b) continue efforts in the development of training and simulation principles,, and (c) perform validation of biopsychometric technology in operational or quasi-operational environments.

## PROJECT OVERVIEW

		90	91
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PROJECT: RS34H20	HUMAN FACTORS TECHNOLOGY	\$ 3.7M	\$ 3.6M
PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Subproject is to provide Navy systems developers with the resources and expertise to implement advanced concepts, by addressing technological opportunities in man-machine interface, decision-making, and information transfer.

In FY90, it is planned to: (a) demonstrate integration of software tools into a functional software engineering environment, and (b) complete development of a prototype decision aid to assist submarine approach officers to develop an accurate understanding of the current three-dimensional ASW tactical situation.

In FY91, it is planned to: (a) begin evaluation of an experimental decision support system to improve the quality and speed of tactical decision-making under highly stressful conditions, and (b) conduct laboratory evaluations of advanced display techniques for undersea surveillance applications.

## PAYOFF/UTILIZATION:

The payoff of this Subproject is the provision to Navy systems developers of resources and expertise in the areas of man-machine interface, decision-making, and information transfer, thus enabling improved system design with better utilization of the human component.

In FY89, specific accomplishments included: (a) demonstration of an integrated Software Engineering Environment capability using Ada language system facilities, and (b) completion of a laboratory evaluation of a decision support system to assist anti-submarine warfare tacticians in integrating information from multiple sources.

## PROJECT OVERVIEW

		90	91
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PROJECT: RS34H21	BIOPSYCHOMETRIC ASSESSMENT	\$ 0.7M	\$ 0.6M
PE: 62234N	SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to monitor human performance associated with critical jobs, with improved prediction of performance decrement.

Such performance decrements may not be recognizable through traditional performance assessment means, over short time periods, such as minutes. Monitoring will be online, in real time, and be unobtrusive. The operational tasks and systems are characterized by information system displays and panels and the information overload and underload associated with those systems.

Biopsychometric assessment refers to physiological measures of personnel with primary emphasis on neuroelectric measures of brain activity.

The accelerated worldwide development of technology makes it mandatory that the Navy keep abreast of developments that may pose unexpected threats or provide unanticipated opportunities. One such threat is posed by the proliferation of complex ship- and air-borne weapons systems. Evidence indicates that performance of combat-related cognitive tasks, such as detection and tracking by combat system operators (e.g., radar operators, sonar operators, aviators and air traffic controllers), may be variable in quality and often below predicted levels of performance.

This Project provides improved personnel readiness assessment based on psychophysiological techniques, and develops techniques for the maintenance and enhancement of performance under sustained operations. The approach is to develop measures of event-related potentials (ERP) that can aid in monitoring the cognitive functions of individual military personnel to improve performance of complex systems of which they are a part. Ultimately, such ERP measures may be used in real-time as feedback or control signals in operational environments and classrooms. These measures may also be used in controlled settings as aids for the design and evaluation of complex systems, work schedules, and drug effects.

In FY90, it is planned to: (a) study at more microscopic levels ERP-performance relationships known to exist at gross levels, (b) develop methods that can be of practical value in Navy operations, and (c) produce the description of these relationships.

In FY91-92, it is planned that the description of the relationships will serve as the basis for application of ERP methods to high-fidelity combat system simulations.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved assessment of the combat readiness of system operators, and (b) enhanced system operators' performance in real-time.

In FY89 specific accomplishments included the performance of a cross-laboratory calibration experiment; the primary objective being to replicate a well-known psychophysiological effect in four independent laboratories.

## PROGRAM ELEMENT OVERVIEW

PE: 63701N                      HUMAN FACTORS ENGINEERING DEVELOPMENT  
CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
DoD ORGANIZATION:            NAVY  
  
FUNDING:                      FY90 \$ 2.5M (FY91 PRESIDENT'S BUDGET)  
                                FY91 \$ 2.9M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objectives of this Program Element are to: (a) improve crew and workstation design and evaluation methods to reduce errors and increase effectiveness of operation, (b) establish target acquisition and weapon system standards for displays people can understand, (c) develop airborne tactical decision aids for fleet air defense, anti-submarine warfare (ASW), and strike missions, (d) provide initial human factors support for new systems, and (e) improve the integration between ships and their crews.

This Program improves fleet readiness through human factors technology.

The in-house organizations responsible for this program are Naval Air Development Center, Naval Weapons Center, Naval Air Test Center, and Naval Ocean Systems Center.

## RELATED ACTIVITIES:

Program Element 62234N, Training and Human Factors Technology; Program Element 64703N, Personnel, Training, Simulation, and Human Factors.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include assurance of a good fit among the operator, the equipment, and the mission in Navy systems. As a result, hardware systems operate more rapidly with fewer human-induced errors and with greater safety and maintainability. The development of these new human factors engineering technologies and their incorporation into the design of Navy systems will result in improved fleet performance.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in developing/demonstrating human factors engineering technology, and incorporating human engineering during system acquisition.



## PROJECT OVERVIEW

		90	91
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PROJECT: R1771	SHIP HUMAN FACTORS	\$ 1.6M	\$ 1.9M
	ENGINEERING DEVELOPMENT		
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL OCEAN SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project, which responds to recommendations by the Government Accounting Office (GAO), the Defense Science Board, and the Naval Research Advisory Committee, is to improve shipboard performance by incorporating human factors engineering during weapon system acquisition.

Thrusts of this Project include: (a) tactical information management and decision-making, (b) battle force information management, (c) multisensor integration and data display, (d) combat system design, and (e) computer-based operator aids.

In FY90, plans include: (a) using the submarine simulation facility to measure the decision-making performance of the submarine approach officer, (b) incorporating command effectiveness data into the Force Performance Database, (c) developing a user interface for the MILSTAR communications operator aid, (d) identifying Anti-Submarine Warfare (ASW) scenarios to use in evaluating prototype display formats for surface ship combat systems, and (e) selecting/evaluating additional techniques for analyzing performance during fleet exercises.

FY91, plans include: (a) completing the interactive workstation for the submarine approach officer, (b) incorporating manpower and training data into the Force Performance Database, (c) validating software algorithms for the MILSTAR communications operator aid, (d) evaluating prototype display formats for surface ship combat systems in an operational ASW environment, and (e) completing development of tools for assessing performance during fleet exercises.

## PAYOFF/UTILIZATION:

The payoffs of this Project include solutions to man-machine interface problems through increased and more effective use of human factors engineering techniques in weapon system acquisition.

In FY89, specific accomplishments included: (a) evaluation of combat data displays for submarine tactical approach officers, (b) entering of major platforms, weapons systems, and equipments into the Force Performance Database, (c) identification of requirements for the MILSTAR communications operator aid, (d) evaluation of prototype display formats for the Rapid Air Defense System, (e) development of operator interaction displays for battle group escort operations, and (f) evaluation of techniques to enable warfare officers to transform fleet exercise data into information requirements.

## PROJECT OVERVIEW

		90	91
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PROJECT: W0542	AIR HUMAN FACTORS ENGINEERING	\$ 0.9M	\$ 1.0M
PE: 63701N	HUMAN FACTORS ENGINEERING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL AIR DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop/demonstrate human factors engineering (HFE) technology for (1) establishing human factors requirements for new systems, and (2) evaluating the impact of human factors on effectiveness of systems in development or test and evaluation (T&E).

In FY90, plans include: (a) initiating Anti-Submarine Warfare (ASW) decision aid development, (b) continuing work on HFE development, test and evaluation (DT&E) tools, (c) completing development, demonstration, and transition of IEMD to tactical programs, including F/A-18, X-31, and NATF, and (d) initiating development/evaluation of HFE design requirements analysis tools.

In FY91, plans include: (a) completing development, demonstration, and transition of HFE DT&E tools to Air Combat Environment Test Evaluation Facility (ACETEF), (b) completing development, demonstration, and transition of ASW decision aid, (c) continuing development of HFE design requirements analysis tool, and (d) starting development of HFE tools for operational T&E.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved aircrew performance in Naval aircraft systems for air combat and airborne command, control and communications. Improved performance will be accomplished by applying human factors engineering methods in the design and modification of airborne systems.

In FY89, specific accomplishments included: (a) demonstration of Anti-electronic Warfare (AEW) decision aid, transitioned to a classified program, (b) completion, demonstration, and implementation of the rapid prototyping tool, (c) continued development of tools for developmental T&E, (d) a delayed start of the ASW decision aid due to resource constraints, restructuring the program to focus on high-payoff efforts and to focus later efforts on HFE design requirements analysis and HFE T&E tools, (e) employment of a rapid transition (within 3 years) criterion to proposals for FY90 and beyond, and (f) initiation of interagency (Department of Defense, Department of Transportation, Department of Energy) HFE R&D strategy planning efforts.

## PROGRAM ELEMENT OVERVIEW

PE: 63707N                      MANPOWER AND PERSONNEL SYSTEMS  
 CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
 DoD ORGANIZATION:            NAVY  
 FUNDING:                      FY90 \$ 3.0M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 3.2M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to address the need to produce required levels of personnel readiness, without increasing the cost of manpower, by exploiting emergent technologies.

Computer-based measurement techniques will be used to verify job classification measures in terms of performance on-the-job (vice training performance). The application of computer technology and advanced mathematical programming codes to personnel assignment will enable the Navy to maximize job fill, fleet needs, and individual preferences without increasing the cost of rotating personnel.

This Program responds to Congressional/DoD guidance to improve the use of Navy manpower and personnel resources through advanced technology.

The in-house developing organization responsible for this program is the Navy Personnel Research and Development Center, San Diego, CA.

## RELATED ACTIVITIES:

0602722A, Personnel and Training; 0602233N, Mission Support Technology; 0602703F, Personnel Utilization Technology; 0603731A, Manpower and Personnel; 0604703N, Personnel Training, Simulation, and Human Factors; 0603732M, Marine Corps Advanced Manpower Training Systems; and 0603704F, Manpower and Personnel Systems Technology.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include improved accession and utilization of people resources through better classification, skill level assignments, productivity, and retention.

Specific payoffs include: (a) improved forecasts of manpower requirements, (b) better job performance measures, leading to enhanced recruitment and classification standards for accession of higher quality enlistees, (c) more accurate assignment of personnel, (d) better management of the Navy's enlisted and officer personnel, and (e) more timely and appropriate understanding and meeting of concerns of military and civilian personnel, and thus, improved performance and retention.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in the areas of: (a) selection standards for major enlisted job categories, and (b) an optimal assignment system.

## PROJECT OVERVIEW

		90	91
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PROJECT: R1770	MANPOWER AND PERSONNEL SYSTEMS	\$ 3.0M	\$ 3.2M
PE: 63707N	MANPOWER AND PERSONNEL SYSTEMS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to apply math optimization, computer technology, manpower/personnel forecasting, and human performance measurement. These technologies are used to design and develop systems to improve personnel assignment and human performance, and to better project and manage personnel inventories.

This Project responds to Congressional/DoD guidance to improve the use of Navy manpower and personnel resources through advanced technology.

In FY90, plans include: (a) evaluating an optimal assignment system for 50 percent of enlisted personnel, and (b) validating selection standards for electrical jobs.

In FY91, plans include: (a) establishing quality selection standards for major enlisted job categories, and (b) testing an optimal assignment system using Permanent Change of Station (PCS) and school constraints.

## PAYOFF/UTILIZATION:

The payoff of this Project is improved manpower utilization (i.e., requirements, recruitment and classification standards, assignment of personnel, management of personnel inventory, and increased retention and satisfaction of civilian and military personnel).

In FY89, accomplishments included: (a) testing of optimal assignment procedures for minimizing enroute training, (b) testing of improved ways of forecasting PCS moves, and (c) validation of selection standards for electronics jobs.



## PROJECT OVERVIEW

		90	91
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PROJECT: R1772	EDUCATION AND TRAINING	\$ 5.2M	\$ 6.0M
PE: 63720N	EDUCATION AND TRAINING		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to apply automation and expert systems to training development, revision, delivery and management. Technology areas include artificial intelligence, expert systems, performance training aids, automated performance testing and training evaluation.

This Project responds to Congressional and DoD directives to improve training and meet critical needs through advanced technology.

In FY90, plans include: (a) beginning a small extension of the training materials development system to logistics information sources, (b) beginning reduced implementation of advanced microcomputer training systems at fleet and reserve sites, and (c) beginning the application of expert system technology to development of simulations for training.

In FY91, plans include: (a) applying artificial intelligence to logistics/training materials development, (b) applying new technologies to performance testing, tying training to new job requirements, and (c) beginning the implementation of expert tools for training resource management.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) automated training systems adaptable to the changing nature of Navy jobs, (b) improved training quality in the classroom, on-the-job, and for the Reserves, and (c) a simplified and standardized instructional development process.

In FY89, specific accomplishments included: (a) application of curriculum/delivery technologies to counter low entry skills in initial technical training, and (b) field testing of the surface battle management trainer.

## PROGRAM ELEMENT OVERVIEW

PE: 63732M                      ADVANCED MANPOWER/TRAINING SYSTEMS  
CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
DoD ORGANIZATION:            MC  
  
FUNDING:                      FY90 \$ 4.0M (FY91 PRESIDENT'S BUDGET)  
                                 FY91 \$ 3.1M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to provide the RDT&E funds for the advanced development of systems and equipment to improve the manpower and training readiness of the Fleet Marine Force and to develop techniques and methods that advance the use and control of human resources in the Marine Corps.

This objective will be met by work in the following areas: (a) human resources management and forecasting, (b) training devices and simulators, (c) Marine Corps training resources development and analysis, and (d) Marine Corps professional military education.

The in-house developing organization responsible for this program is the Navy Personnel Research and Development Center.

## RELATED ACTIVITIES:

This program relates to all Armed Services' human resources management and forecasting, and provides funding to develop Marine Corps-unique requirements and to participate in Congressionally directed joint-Service efforts.

## PAYOFF/UTILIZATION:

The payoff of the Program Element will be enhanced Fleet Marine Force readiness due to improved manpower training, planning, and control.

Work under this Program Element will result in: (a) techniques and methods that advance the use and control of human resources in the Marine Corps, (b) development of training devices and simulators not developed in conjunction with a major end item, (c) methods and techniques to improve the effectiveness of training conducted throughout the Marine Corps, and (d) software enhancements to the instructional management system.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in model software for Marine Corps manpower planning in numerous discrete areas.

## PROJECT OVERVIEW

		90	91
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PROJECT: C0073	HUMAN RESOURCES MANAGEMENT AND FORECASTING	\$ 4.0M	\$ 3.1M
PE: 63732M	ADVANCED MANPOWER/TRAINING SYSTEMS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	MC		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop systems and equipment to improve the manpower readiness of the Fleet Marine Force, and develop techniques and methods which advance the use and control of human resources in the Marine Corps.

In FY90, plans include: (a) initiating two new programs, Joint Human Resource Studies (JHRS), to identify system vulnerability, and Precise Personnel Assignment System (PREPAS) II, to plan for incorporation of new technologies into manpower systems, and (b) conducting Joint Performance Measurement (JPM) field testing.

In FY91, plans include: (a) implementing the Selective Reenlistment and Enlistment Bonus models, (b) developing alternative corrective strategies for JHRS, and (c) formulating modernization proposals and estimate requirements for PREPAS II.

## PAYOFF/UTILIZATION:

The payoffs of this Project include advanced system development for human resources management and forecasting to improve Marine manpower readiness.

In FY89, specific accomplishments included: (a) completion of the Officer Assignment Decision Support System (OADSS), (b) beginning of a new phase of Joint Performance Measurement (JPM), and (c) completion of the Reserve Program Module and Qualified Military Available for the Automated Recruit Management System.



## PROGRAM ELEMENT OVERVIEW

PE: 63733N                      SIMULATION AND TRAINING DEVICE TECHNOLOGY  
CONGRESSIONAL CATEGORY:      SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION:            NAVY  
  
FUNDING:                      FY90 \$ 1.0M (FY91 PRESIDENT'S BUDGET)  
                                 FY91 \$ 5.0M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to demonstrate proof-of-concept, reduction of risk, and cost effectiveness in new simulation and training technology and equipment. It is the principal link between exploratory development and training device procurement in aviation, surface and subsurface systems.

This effort targets simulation and training device research by addressing training deficiencies identified in Warfare Area Assessments, Fleet research and Development Objectives, Operational Requirements, and Fleet endorsements. It seeks to improve warfighting capability through enhanced training, greater affordability and increased safety. Technical areas include: (a) visual, motion, sensor, weapons fire, and maintenance simulation, (b) improved software techniques for simulation, and (c) instructional systems methods, part-task trainer designs, and trainer designs based on artificial intelligence.

The in-house developing organization responsible for this program is the Naval Training Systems Center.

## RELATED ACTIVITIES:

Program Elements 0602233N, Training Devices and Simulation; 0604703N, Personnel Training, Simulation, and Human Factors; 0603216A, Synthetic Flight Simulator Development; 0603227F, Personnel, Training, and Simulation Technology; and 0603701N, Human Factors Engineering.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include new capabilities in simulation training technology and equipment, with principal focus on proof-of-concept, reduction of risk, and cost effectiveness in training device acquisition. It is estimated that millions of dollars could be saved as a result of the work done under this Program Element.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress in the area of deployable trainers, embedded training systems, tactical environment simulators and crew coordination training.

## PROJECT OVERVIEW

		90	91
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PROJECT: W1773	SIMULATION AND TRAINING DEVICES	\$ 1.0M	\$ 5.0M
PE: 63733N	SIMULATION AND TRAINING DEVICE TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to demonstrate proof-of-concept, risk reduction, and cost effectiveness in simulators and training technology. It links exploratory development and engineering prototypes in aviation, surface and subsurface training systems.

In FY90, plans include: (a) focusing on technologies for full-mission rehearsal capability for a deployable trainer.

In FY91, plans include: (a) continuing work on deployable trainers and embedded training systems, (b) expanding tactical environment simulators to the F-14 and A-6, and (c) adding a surface component to crew coordination.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improvements in: (a) visual, motion, sensor, weapons fire, and maintenance simulation components and capabilities, (b) software techniques for simulation, and (c) instructional-systems methods, part-task trainer designs, and trainer designs based on artificial intelligence.

In FY89, specific accomplishments included: (a) development/demonstration of technology for an advanced, deployable weapon system part-task trainer for the F/A-18, (b) development/demonstration of an embedded radar trainer for SPA 25G technology, enabling a large reduction in acquisition cost, and (c) beginning of the universal threat environment generator technology demonstration to support joint-Service acquisition.

## PROGRAM ELEMENT OVERVIEW

PE: 64703N PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL

DoD ORGANIZATION: NAVY

FUNDING: FY90 \$ 1.0M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 1.1M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of this Program Element is to develop systems that are both innovative and cost-effective to help ensure Fleet readiness. This Program applies advanced technologies to operational requirements in manpower, personnel, training, and human factors.

Computer-based manpower and personnel systems ensure Navy combat readiness by raising the overall quality of manpower accessed into the Navy and assigned to the Fleet. The Computerized Adaptive Testing system for the Armed Services Vocational Aptitude Battery (CAT-ASVAB) will be much more cost-effective than the existing paper-and-pencil methods. A simulation of personnel inventory flows is required to analyze and adjust enlisted rotation patterns to maintain Fleet readiness by optimizing short-term savings in Permanent Change of Station costs versus long-term savings in retention costs.

The work is performed by the Navy Personnel Research and Development Center.

## RELATED ACTIVITIES:

0602722A, Personnel and Training; 0602703F, Personnel Utilization Technology; 0603731A, Manpower and Personnel; 0603707N, Manpower and Personnel Systems; 0603732M, Marine Corps Advanced Manpower Training Systems; and 0603704F, Manpower and Personnel Systems Technology.

## PAYOFF/UTILIZATION:

The payoff of this Program Element is improvement in the overall quality of manpower processed into the Navy and assigned to the Fleet.

The Computerized Adaptive Testing system for the Armed Services Vocational Aptitude Battery (CAT-ASVAB) will reduce administration time at Military Entrance Processing Stations, improve scoring accuracy, provide better security, and lend itself to quick, accurate, standardized revisions. This test-administration system will be far more cost-effective than the existing paper-and-pencil methods.

## FUTURE DIRECTIONS:

Beyond FY91, plans for this Program Element include continuing progress on CAT-ASVAB analysis, and the personnel assignment system.

## PROJECT OVERVIEW

		90	91
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PROJECT: R1822	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	\$ 1.0M	\$ 1.1M
PE: 64703N	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is apply advanced technologies to operational requirements in manpower, personnel, training, and human factors. It focuses on adaptive testing, math optimization, manpower forecasting, computer-based simulation, and decision support systems.

In FY90, plans include: (a) initiating score-equating verification for CAT-ASVAB, (b) developing a full-scale sea/shore rotation management model, and (c) evaluating recruiter effectiveness.

In FY91, plans include: (a) analyzing the CAT-ASVAB score-equating verification data, and (b) testing/evaluating the optimal personnel assignment system for operational use.

## PAYOFF/UTILIZATION:

The payoff of this Project is improved alignment of personnel inventory with authorizations, and thus enhance force readiness.

In FY89, specific accomplishments included: (a) development of Computerized Adaptive Test (CAT) equating procedures, and (b) testing of prototype rotation models.

## PROGRAM ELEMENT OVERVIEW

PE: 64715N SURFACE WARFARE TRAINING  
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
 DoD ORGANIZATION: NAVY  
 FUNDING: FY90 \$ 17.2M (FY91 PRESIDENT'S BUDGET)  
 FY91 \$ 12.4M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to support the Chief of Naval Operations Surface Warfare Sponsor mission by improving readiness and training.

This Program Element was developed to satisfy the requirements of the Fleet and the Chief of Naval Education and Training, for development of prototype surface warfare training devices to provide improved training, thereby improving operational readiness, efficiency, and safety while decreasing training time and cost.

This Program Element has four general areas of effort: (a) operator/team trainers in the area of electronic/acoustic surveillance in ASW (Anti-Submarine Warfare) operations for existing or planned operational equipment, (b) maintenance trainers for various electronic/acoustic devices and trainers in the operation of engine room equipment for existing and new development engineering equipment, (c) modification, update, consolidation, or replacement of existing training devices, and (d) other training problem areas which can benefit by the use of stimulation/simulation training device techniques.

The in-house work is performed by the Naval Training Systems Center.

## RELATED ACTIVITIES:

Not applicable.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved training, (b) reduced training costs, (c) safer training conditions, and (d) enhanced operational readiness.

The high cost of operational training exercises at sea continues to make it imperative to develop, improve, and make extensive use of alternative shipboard methods for individual and team training. Although they are complex and continuously evolving, these training systems will provide realistic training at a fraction of the cost of the same training at sea. They also expose the trainees to a broad range of scenarios that could not be carried out in live situations. The end product is an enhancement of operational readiness.

## FUTURE DIRECTIONS:

In FY91, for the Surface Tactical Team Trainer Project, it is planned to: (a) continue 20A66 (an Anti-Submarine Warfare Tactical Team Trainer) Lot 1 development with emphasis on software development and initial hardware interfacing, and (b) complete Device 20A66 Critical Design Review in early 1991.

In FY91, for the Landing Craft Air Cushion (LCAC) Operator Trainer Project, it is planned to: (a) conduct a test and evaluation and trainer acceptance, and (b) complete the program.

## PROJECT OVERVIEW

		90	91
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PROJECT: S1140	TACTICAL ADVANCED COMBAT	\$ 1.0M	\$ 0.0M
	DIRECTION ELECTRONIC		
	WARFARE (TACDEW)		
	MODIFICATION		
PE: 64715N	SURFACE WARFARE TRAINING		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to achieve a progressive redesign of the environment generation/control system and control systems of the Tactical Advanced Combat Direction and Electronic Warfare (TACDEW) device.

The TACDEW training complexes, located at Fleet Combat Training Centers Atlantic and Pacific, are a vital link in the training chain for integrated combat system team training. This training system will have a direct impact on the Navy's ability to train for battle, specifically, the Navy's capability for integrating combat systems and weapon system trainers in multi-threat/multi-team exercises for both battle group and battle force training, which will represent actual operational situations in any area of the world. During the operational life of these complexes, numerous add-on capabilities have been incorporated and frequent changes have been made to the Master Simulation Program to maintain currency with Fleet training requirements. This continued expansion of the complexes, coupled with obsolescence of the computer system originally installed in TACDEW, have negated the potential for further growth to accommodate training for emerging combat system capabilities identified through the Navy Training Plan process. The Project will include: (a) replacement of the obsolescent computer system with modern computational capabilities, (b) redesign of the Master Simulation Program, (c) substitution of the Generic Radar Display System subsystem to provide capabilities representative of modern radar equipment, and (d) incorporation of a state-of-the-art problem control and evaluation subsystem. The modified TACDEW system will support combat system operational training at all required levels, including individual operator, subteam, and combat system through the year 2000.

In FY90, it is planned to: (a) achieve initial operating capability (November 1989), and (b) complete the logistics support package.

This Project is scheduled for completion in FY90.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improvement of the Navy's ability to train for battle, specifically, the Navy's capability for integrating combat systems and weapon system trainers in multi-threat/multi-team exercises for both battle group and battle force training which, will represent actual operational situations in any area of the world.

In FY89, specific accomplishments included: (a) completion of Phase II development, and (b) completion of installation and delivery of the trainer (August 1989).

## PROJECT OVERVIEW

		90	91
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PROJECT: S1427	SURFACE TACTICAL TEAM TRAINER	\$ 7.2M	\$11.0M
PE: 64715N	SURFACE WARFARE TRAINING		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a generic training system which will replace obsolete/obsolescent devices to provide team procedural and tactical training/evaluation in a multi-threat environment for conventional and tactical data-equipped ships. These devices will have a direct impact on the Navy's ability to train for battle.

The 14A12, Surface Anti-Submarine Warfare (ASW) Trainer, will replace the obsolete devices currently used to provide Anti-Submarine Warfare (ASW) team training (i.e. 14A2). The 14A12 will have the capability to exercise the essential procedures of an ASW engagement and will simulate current and future emerging passive and active sensors operating in a common ocean model. The 20A66, ASW Tactical Team Trainer, will replace the ASW Coordinated Tactics Trainers (X14A6 and 14A6) built in the 1960s, and provide multiple platform/multi-threat procedural, tactical, and decision-making training for single units up to battle group size. Each trainer will be composed of multiple ship, submarine, and aircraft "command centers" configured with multi-purpose equipment, which will simulate the sensor, weapon, and communication capabilities of the platforms represented, and train up to 300 people per year in coordinated ASW battle group operations.

In FY90, it is planned to: (a) complete testing, deliver and install contractor software/system (March 1990), and (b) continue development of the 20A66 with procurement of preliminary Lot I hardware and software for FLEASWTRACENPAC, San Diego.

In FY91 it is planned to: (a) continue 20A66 Lot I development with emphasis on software development and initial hardware interfacing, and (b) complete 20A66 Critical Design Review in early 1991.

The Project is expected to be completed in FY93.

## PAYOFF/UTILIZATION:

The payoff of this Project includes improvement of the Navy's ability to train for battle; specifically, the 14A12 and 20A66 will provide greater capability for existing and emergent surface combatants to conduct multi-platform ASW operations against submarine threats.

In FY89, specific accomplishments included the initial development of the 20A66.



## PROJECT OVERVIEW

		90	91
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PROJECT: S1834	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER	\$ 9.0M	\$ 1.3M
PE: 64715N	SURFACE WARFARE TRAINING		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	NAVY		
RESPONSIBLE ORGANIZATION:	NAVAL TRAINING SYSTEMS CENTER		

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PROJECT SYNOPSIS:

The objective of this Project is to provide an operator trainer for Landing Craft, Air Cushion (LCAC) vehicles.

The LCAC Full Mission Trainer, Device 10G6, will provide LCAC crews (craftmaster, engineer, navigator, and group commander) training in the skills, procedures and techniques required to operate the LCAC. Training will include normal and emergency procedures and proficiency. This device will have direct impact upon the Navy's ability to train for battle; it affords more flexibility and more versatile training in preparing LCAC crews in all phases of craft operations and at a significant cost reduction over use of actual craft.

In FY90, it is planned to: (a) conclude Device 20G6 detailed hardware/software design, (b) continue development/refinement of visual simulation system, (c) procure the digital radar landmass system, and (d) begin hardware/software integration and testing of the motion simulation system.

In FY91, it is planned to: (a) conduct test and evaluation and trainer acceptance, and (b) complete the Project.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) development of a LCAC operation trainer that will provide LCAC crews (Craftmaster, Engineer, Navigator and Group Commander) training in the skills, procedures, and techniques required to operate the LCAC in its operational environment, and (b) enhanced the ability of the Navy to train for battle, specifically, more flexible and versatile training in preparing LCAC crews in all phases of craft operations, and at a significant cost reduction (e.g., fuel, craft maintenance) over use of actual craft for training.

In FY89, specific accomplishments included: (a) continued development of the Full Mission Trainer (FMT) computer programs, (b) continued trainer hardware fabrication, (c) critical design review, (d) contractor acceptance of motion/visual systems, (e) installation of motion and visual systems on FMT, and (f) continued hardware/software integration and testing.

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61153N						DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES
RR04206	ONR	6.890	7.426	ET	6	PERSONNEL AND TRAINING
RR04208	ONR	3.007	3.240	MP	3	GROUP PSYCHOLOGY
RR04209	ONR	2.630	2.835	HF	4	ENGINEERING PSYCHOLOGY
		12.528	13.502			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 61153N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	12.527	13.501

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(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CF31P14	NPRDC	0.525	0.550	MP	2	MARINE CORPS MANPOWER & TRAINING TECHNOLOGY
		-----	-----			
		0.525	0.551			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62131M :						FY90
THE PRESIDENT'S BUDGET, JANUARY 1990						-----
						0.525
						-----
						0.550
						-----

(CONTINUED)

### III-B-1: LISTING OF NAVY PROJECTS

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	8.333	10.375

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS34H20	NOSC	3.739	3.622	HF	4	HUMAN FACTORS TECHNOLOGY
RS34H21	NPRDC	0.650	0.600	HF	5A	BIOPSYCHOMETRIC ASSESSMENT
		4.390	4.223			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62234N :			FY90		FY91	
			-----		-----	
THE PRESIDENT'S BUDGET, JANUARY 1990			4.389		4.222	
-----						

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701N						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NOSC	1.617	1.881	HF	4	SHIP HUMAN FACTORS ENGINEERING DEVELOPMENT
W0542	NADC	0.855	1.002	HF	4	AIR HUMAN FACTORS ENGINEERING
		-----	-----			
		2.473	2.884			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63701N :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	2.472	2.883

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63707N						MANPOWER AND PERSONNEL SYSTEMS
R1770	NPRDC	3.029	3.200	MP	2	MANPOWER AND PERSONNEL SYSTEMS
		----- 3.030	----- 3.201			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63707N :						
						FY90      FY91
						----- 3.029      3.200

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
-----					
63720N					EDUCATION AND TRAINING
R1772	NPRDC	5.222	5.983 ET	6	EDUCATION AND TRAINING
		-----	-----		
		5.223	5.984		TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63720N :			FY90	FY91	
			-----	-----	
THE PRESIDENT'S BUDGET, JANUARY 1990			5.222	5.983	
-----					

(CONTINUED)



(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63732M						ADVANCED MANPOWER/TRAINING SYSTEMS
C0073	NPRDC	3.969	3.110	MP	1A	HUMAN RESOURCES MANAGEMENT AND FORECASTING
		-----	-----			
		3.970	3.110			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63732M :						FY90      FY91
THE PRESIDENT'S BUDGET, JANUARY 1990						----- 3.969      3.110

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
-----						
63733N						SIMULATION AND TRAINING DEVICE TECHNOLOGY
W1773	NTSC	0.973	5.042	ST	6	SIMULATION AND TRAINING DEVICES
		-----	-----			
		0.974	5.043			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63733N :						
						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						0.973
						-----
						FY91
						-----
						5.042
-----						

(CONTINUED)

(CONTINUATION)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
64703N					PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	0.994	1.069 MP	2	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
		----- 0.995	----- 1.069		TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64703N :					
THE PPRESIDENT'S BUDGET, JANUARY 1990					

(CONTINUED)

III-B-1: LISTING OF NAVY PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 (\$M)	CONG CAT	GOAL	PE/PROJECT TITLES
=====						
64715N						SURFACE WARFARE TRAINING
S1140	NTSC	0.972	0.000	ST	6	TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATION
S1427	NTSC	7.197	11.025	ST	6	SURFACE TACTICAL TEAM TRAINER
S1834	NTSC	9.044	1.332	ST	6	LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER
		-----	-----			
		17.213	12.357			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 64715N :						
						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						17.213
						FY91
						-----
						12.357

### III.C. AIR FORCE PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
61102F	DEFENSE RESEARCH SCIENCES	III-C-1
62202F	HUMAN SYSTEMS TECHNOLOGY	III-C-3
62205F	PERSONNEL, TRAINING AND SIMULATION	III-C-8
63106F	LOGISTICS SYSTEMS TECHNOLOGY	III-C-20
63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY	III-C-26
63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY	III-C-31
64227F	FLIGHT SIMULATOR DEVELOPMENT	III-C-35
64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT	III-C-47

Table III-C-1: Listing of Projects - Lists projects for each AIR FORCE program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-C-i

## PROGRAM ELEMENT OVERVIEW

PE: 61102F                      DEFENSE RESEARCH SCIENCES  
CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
DoD ORGANIZATION:            AF  
  
FUNDING:                      FY90 \$ 8.8M (FY91 PRESIDENT'S BUDGET)  
                                FY91 \$ 9.3M (FY91 PRESIDENT'S BUDGET)

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## PE SYNOPSIS:

The objective of the Manpower, Personnel, Training and Safety (MPTS) portion of this Program Element (PE) is to investigate how humans acquire and process information.

This Defense Research Sciences PE is the primary PE for investing in scientific and engineering research. This PE funds research in all scientific disciplines contributing to the Air Force mission. Its goal is to increase scientific and engineering knowledge related to long-term technology needs for national defense. The research program ensures that personnel with the technical expertise to support the Air Force requirements are available at Air Force laboratories, at universities, and in industry. Research represents an investment in the technologies which the Air Force will need to meet new challenges in the twenty-first century. Areas of research include: (a) aerospace structures and aerodynamics, (b) materials, propulsion and power, (c) electronics, (d) computer science and mathematics, (e) directed energy and conventional weapons, (f) life sciences, and (g) terrestrial, atmospheric, and space sciences. Results from this PE support the entire technology base and transition to the breadth of Air Force Development Programs.

## RELATED ACTIVITIES:

The Air Force basic research program is conducted in Air Force laboratories and under extramural grants and contracts with academic institutions and industry. The entire program is managed by the Air Force Office of Scientific Research. Research for the MPTS portion of this PE is now underway with the Air Force Human Resource Laboratory, USAF School of Aerospace Medicine, and the Armstrong Aerospace Medical Research Laboratory.

The Human Resources Project of this Program Element provides the knowledge required to ensure that Air Force personnel can operate, maintain, and manage complex equipment systems in demanding environments.

## PAYOFF/UTILIZATION:

The payoff of the MPTS portion of this Program Element is to gain knowledge which can: (a) enhance human performance, and (b) improve man-machine interface.

## FUTURE DIRECTIONS:

Major thrusts for the MPTS portion of this PE, in FY91 and beyond, will continue in the areas of: (a) cognitive maps, (b) visual and auditory information processing, and (c) decision-making.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 2313	HUMAN RESOURCES	\$ 8.8M	\$ 9.3M
PE: 61102F	DEFENSE RESEARCH SCIENCES		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE OFFICE OF SCIENTIFIC RESEARCH		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to investigate how humans acquire and process information. Insights gained may: (a) enhance human performance in the areas of hearing, seeing, perception, attention span, memory, learning, and problem solving, and (b) improve the man-machine interfaces for complex systems such as aircraft. This knowledge may also find application in the design of smart systems to emulate the human capabilities to recognize visual scenes, speech and to solve problems. Information on the way humans process information is expected to contribute to improved criteria and testing techniques for matching personnel skills with job requirements.

In FY90 it is planned to: (a) begin a new research initiative on spatial orientation to find ways to prevent accidents caused by crew disorientation in high-performance aircraft, and (b) continue research on how humans process visual and auditory information and on cognitive functions.

In FY91, it is planned to: (a) expand research on cognitive maps, which humans use to navigate through their environment and to track physical relationships of objects, (b) continue research on how humans process visual and auditory information in order to develop new sensors and displays that are more compatible with human operators, and (c) begin new research on decision-making under time pressure in order to develop decision-making strategies and to improve the abilities of humans to make correct decisions in emergency situations.

## PAYOFF/UTILIZATION:

The payoff of this Project will be improved criteria and testing techniques for matching personnel skills with job requirements. This ability will yield better mission performance through selection of better qualified personnel to operate complex systems and a monetary savings in terms of more efficient training.

In FY89, accomplishments for the MPTS portion of this PE included: (a) developing a model of sensory-motor learning and control that will undergo advanced development for robotics, and (b) developing a computational model of peripheral auditory function which is being followed by validation of its use for speech recognition systems.

## PROGRAM ELEMENT OVERVIEW

PE: 62202F                      HUMAN SYSTEMS TECHNOLOGY  
 CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
 DoD ORGANIZATION:            AF  
 FUNDING:                      FY90 \$ 12.0M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 12.0M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to focus on human aspects of the man interface with weapon systems.

Thrusts of this Science and Technology program are to: (a) improve human performance in weapon system operations by refining crew selection, crew protection, and man-machine integration, (b) improve safety and protect Air Force personnel from radiation, chemical, and mechanical forces, (c) use our understanding of human factors to invent threats and countermeasures effective against enemy weapon system operators, and (d) develop defense measures for air base operations, casualty care evacuation, and personal protective equipment.

This Program Element also provides management and operational support for the three laboratories of the Human Systems Division.

The in-house developing organization responsible for this program is the Human Systems Division through its three laboratories: the United States Air Force School of Aerospace Medicine, the Armstrong Aerospace Medical Research Laboratory, and the Air Force Human Resources Laboratory.

## RELATED ACTIVITIES:

The Program is formally coordinated with the Army, Navy and National Aeronautics and Space Administration through a variety of mechanisms including the Tri-Service Aeromedical Research Panel, the DoD Human Factors Engineering Technical Advisory Group, and the Armed Services Biomedical Research Evaluation and Management (ASBREM) Program. In addition, USAF positions have been established with the U.S Army Medical Research and Development Command, the the Naval Medical Research Institute, and NASA. Data Exchange Agreements (DEAs) on testing of air and ground crew equipment are used to facilitate international cooperation.

Related Program Elements include: 0602720A, Environmental Quality Technology; 0602777A, Systems Health Hazard Prevention Technology; 0602205F, Training /Simulation Technology; 0603227F, Advanced Simulator Technology; 0603231F, Crew Systems and Personnel Protection Technology; 0604703F, Aeromedical/Chemical Defense Systems Development; 0604706F, Life Support System 412A; 0604601F, Chemical/Biological Defense Equipment; 0702986F, Clothing Development; 0602204F, Aerospace Avionics; 0602702F, Command, Control, Communications; and 0601102F, Defense Research Sciences. Related flight dynamics Program Elements include: 0602201F, Aerospace Flight Dynamics; 0603205F, Flight Vehicle Technology; and 0603245F, Advanced Fighter Technology Integration. Related Army non-medical Program Elements include: 0602622A, Chemical and Smoke Technology; 0603806A, Chemical/Biological Defense; 0603803A, Chemical Systems Advanced Development; 0603759A, Chemical Biological Advanced Technology; 0604803A, Chemical Systems Engineering Development; 0604806A, Chemical Biological Radiological Defense Equipment Engineering Development; 0605710A, Joint Chemical Biological Point of Contact Test and Assessment; and 0601102A, Defense Research Sciences. Related Army medical Program Elements include: 0602787A, Medical Defense Against Chemical Warfare; 0603751F, Medical Defense Against Chemical Warfare; 0604757A,



Medical Chemical Defense; and 0603002A, Medical Defense Life Support Material. Related Navy Program Elements include: 0602233N, Mission Support Technology; and 0604506N, Chemical Warfare Countermeasures.

There is no unnecessary duplication of effort within USAF or DoD.

PAYOFF/UTILIZATION:

The payoffs for the Manpower, Personnel, Training and Safety (MPTS) portion of this Program Element include: (a) the design of more effective weapon systems which capitalize on advanced human engineering concepts and techniques, (b) the development of technologies to assess human performance on space flights, (c) the development of command, control and communications (C3) simulation systems for interactive testing, (d) the development of advanced display and simulation technology for tactical aircraft systems, and (e) the development of systems to maximize human operator efficiency.

FUTURE DIRECTIONS:

Major thrusts for the MPTS portion of this PE, in FY91 and beyond, will continue in the areas of: (a) for the Manned Weapon Systems Effectiveness Project, radar detection and human performance on visual tasks while on orbit, and (b) for the Man-Machine Integration Technology Project, design specifications for the second generation of the Super Cockpit initiative and development of a miniaturized helmet-mounted cathode ray tube display.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 06MD	HUMAN SYSTEMS DIVISION	\$ 4.3M	\$ 4.5M
	LABORATORY OPERATIONS		
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

-----  
PROJECT SYNOPSIS:

The objective of the Manpower, Personnel, Training and Safety (MPTS) portion of this Project is to support and complement all other Projects in this Program Element and provide for management, support and operation of the United States Air Force Human Systems Division. It provides for the pay and related costs of civilian physicians, scientists, engineers and support personnel, travel, transportation of equipment, rents, communications, utilities, laboratory supplies, unique equipment and other related costs needed to conduct human systems technology research and exploratory development. It also funds salary, travel and equipment for personnel at Aeronautical Systems Division to assist in actions with Human Systems division.

Funding indicated includes only the MPTS portion of this Project.

In FY90/91 it is planned to continue to provide operations support to the Project.

## PAYOFF/UTILIZATION:

The payoff of the Manpower, Personnel, Training and Safety (MPTS) portion of this Project includes the provision of resources to enable the in-house MPTS research and development activities of the Human Systems Division and its laboratories to be conducted.

This Project allows and facilitates the research efforts of the Aerospace Biotechnology Program (the core Air Force technology base program) to optimize the role of the human operator in the design, development, and operation of increasingly complex and technologically sophisticated weapon systems.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 6893	MANNED WEAPON SYSTEMS EFFECTIVENESS	\$ 1.2M	\$ 1.2M
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to develop mission-effective techniques to deceive the operators of enemy air-to-ground and ground-to-air systems.

Visual camouflage, optical countermeasures and techniques to defeat infrared and radar sensors are developed, simulated in the laboratory, and field tested. A variety of studies of human perception are also performed. Measurement of enemy anti-aircraft operator performance is accomplished with simulation and flight tests. Countermeasures are developed and delivered to the Tactical Air Command, and United States Air Force Europe.

In FY90, it is planned to: (a) determine the effectiveness of optical countermeasures associated with F-15 and F-16 decoy flight tests, and (b) assess the threat from manned systems to penetrating air base defenses.

In FY91, it planned to: (a) assess a methodology to deceive infrared sensors and high resolution detection techniques of new radar systems, and (b) test mans' capability to perform operationally-oriented visual tasks while in orbit.

## PAYOFF/UTILIZATION:

The payoffs of the Project include: (a) improved survivability against enemy threat systems, (b) validated criteria for simulator design, and (c) increased knowledge of manned threat system capabilities and vulnerabilities.

In FY89, specific accomplishments included developing a special telescope to determine human pointing, tracking and visual performance in space.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 7184	MAN-MACHINE INTEGRATION TECHNOLOGY	\$ 6.5M	\$ 6.3M
PE: 62202F	HUMAN SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to develop procedures and technologies to optimize the interface between Air Force personnel and the weapon systems they operate.

This Project will: (a) gather and analyze information about the characteristics of human operators to provide design data for system control and display development, and (b) develop methods for simulating mans' interface to machines to measure the changes in weapon effectiveness as a result of changes in man-machine coupling.

In FY90, it is planned to: (a) design the display requirements for the first ejection-compatible tactical night vision system for improved night combat effectiveness, and (b) evaluate the design of a strategic crew station intended to enhance information displays to crew members during combat.

In FY91, it is planned to: (a) specify the design for the second-generation of the Super Cockpit initiative, including three-dimensional imaging and vision and voice-actuated systems, and (b) develop a miniaturized helmet-mounted cathode ray tube display with full color imaging.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) the improvement of weapon system performance by optimizing man-machine coupling, and (b) the development of methodologies and technologies to maximize the efficiency and effectiveness of the human operator interfacing with Air Force systems.

In FY89, specific accomplishments included: (a) completing an image-generating terminal for simulating air-to-air combat in a three-dimensional viewing field, and (b) completing the brassboard helmet-mounted display with wide field-of-view.

## PROGRAM ELEMENT OVERVIEW

PE: 62205F PERSONNEL, TRAINING, AND SIMULATION

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING  
HUMAN FACTORS  
SIMULATION & TRAINING DEVICES  
MANPOWER & PERSONNEL

DoD ORGANIZATION: AF

FUNDING: FY90 \$ 28.2M (FY91 PRESIDENT'S BUDGET)  
FY91 \$ 30.5M (FY91 PRESIDENT'S BUDGET)

-----  
PE SYNOPSIS:

The objective of this Program Element (PE) is to improve operational readiness and effectiveness by developing technologies to: (a) enable more effective classification, assignment, training, and retention of personnel, and (b) minimize the manpower and equipment necessary to conduct maintenance.

Research efforts for this PE consist of: (a) Training Development and Assessment Technology, (b) Aircrew Training Technology, (c) Logistics and Maintenance Technology, (d) Command and Control Training, and (e) Force Acquisition and Distribution Systems.

These technical programs include development and demonstration of improved: (a) quality and effectiveness of Air Force enlisted maintenance and support personnel, (b) methods and techniques for aircrew training, (c) Air Force combat and peacetime operations logistics support, (d) methods for analyzing peacetime/wartime command and control job performance and training requirements, and (e) methods to ensure that the best qualified individuals are selected, classified, and assigned.

This program also provides management and operational support for the Air Force Human Resources Laboratory, Brooks AFB, TX.

The in-house developing organization responsible for this program is the Air Force Human Resources Laboratory (AFHRL). Four laboratory divisions support this Program Element: Manpower and Personnel Division, Logistics and Human Factors Division, Operations Training Division, and Training Systems Division.

## RELATED ACTIVITIES:

Related Program Elements are: 0602233N, Mission Support Technology: Personnel Training and Simulation Technology; 0602785A, Manpower, Personnel and Training Technology; 0602716A, Human Factors Engineering Technology Development; 0604243, Manpower, Personnel and Training Development; 0602234N, Mission Support Technology: Human Factors Technology Area; 0603106F, Logistics Systems Technology; 0603227F, Personnel, Training, and Simulation Technology; 0604227F, Flight Simulator Development; 0602727A, Non-System Training Devices Technology; and 0602234N, Mission Support Technology: Human Factors Technology Area.

For this PE, The Air Force Human Resources Laboratory has formal agreements with the Army and Navy to share development of computer-based training technologies and with the Army for advanced computer image generation technology development. The Navy has a liaison office with the Operations Training Division at Williams AFB.

No unnecessary duplication of effort exists for this PE within the Air Force or the DoD.

PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) increased operational readiness by developing technologies to enable more effective classification, assignment, training and retention of personnel, and (b) minimization of the manpower and equipment necessary to conduct maintenance.

FUTURE DIRECTIONS:

Major thrusts for this Program Element in FY91 and beyond will continue in the areas of: (a) for the Laboratory Support Project, continued funding for the operation of the Air Force Human Resources Laboratory, (b) for the Training Development and Assessment Technology Project, research on intelligent training systems, (c) for the Aircrew Training Technology Project, research in simulation technology, (d) for the Logistics and Maintenance Technology Project, logistics system design and requirements and training methods for maintenance personnel, (e) for the Command and Control Training Project, training for battle management decision making, and (f) for the Force Acquisition and Distribution Systems Project, quantifying the value of Air Force experience and development of a Total Force Impact Model.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 06HT-ET	LABORATORY SUPPORT	\$ 2.6M	\$ 2.8M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

This project supports and complements all Education and Training Projects within Program Element 62205F.

## PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas, to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 06HT-HF	LABORATORY SUPPORT	\$ 2.7M	\$ 3.1M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

This Project supports and complements all Human Factors Projects within Program Element 62205F.

## PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.



## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 06HT-MP	LABORATORY SUPPORT	\$ 3.6M	\$ 3.9M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to fund the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

This Project supports and complements all Human Factors Projects within Program Element 62205F.

## PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 06HT-ST	LABORATORY SUPPORT	\$ 2.9M	\$ 3.4M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to fund of the operation of the Air Force Human Resources Laboratory (AFHRL) at Brooks Air Force Base, Texas, including pay and related costs of civilian scientists and support personnel, travel, transportation, rent, communications, maintenance, procurement of supplies and equipment, and contractor support services.

This Project supports and complements all Simulation and Training Devices Projects within Program Element 62205F.

## PAYOFF/UTILIZATION:

The payoff of this Project includes enabling the many and varied research tasks of AFHRL at Brooks Air Force Base, Texas to be accomplished by handling the support functions of the lab such as travel, transportation, communications, maintenance, procurement of supplies and equipment, etc.

## PROJECT OVERVIEW

	90	91
	----	----
PROJECT: 1121	TRAINING DEVELOPMENT AND \$ 2.3M	\$ 2.6M
	ASSESSMENT TECHNOLOGY	
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY	

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) improve the quality and effectiveness of training for Air Force enlisted maintenance and support personnel by developing technology to accelerate learning, increase skill/knowledge retention, and improve job performance, (b) develop cost-effective methods for designing, delivering, and evaluating training, and (c) determine the most effective uses of computer technology for training.

In FY90, it is planned to: (a) determine the feasibility of using neural networks to enhance the performance of intelligent tutoring systems, (b) begin investigating machine learning and knowledge-based instructional planning, (c) develop methods to simulate current and alternative Air Force enlisted specialty structures, estimating training resource capacity and training costs, and (d) develop methods to use job performance for training content validity assessment.

In FY91, it is planned to: (a) determine the effectiveness of using neural networks to train and control intelligent tutors, (b) continue experiments on the effectiveness of different instructional approaches in intelligent training systems, (c) continue developing machine learning and knowledge-based instructional planning technologies, and (d) continue developing methods for identifying areas of over- and under-training based on job performance.

As part of the streamlining effort, Project 7734, "Force Management System" was combined with this Project during FY89.

## PAYOFF/UTILIZATION:

The payoffs of this Project are improved quality and cost effectiveness of technical training for Air Force enlisted maintenance and support personnel by developing technology to accelerate learning, increase skill/knowledge retention, and improve job performance. This Project will develop cost effective methods for designing, delivering, and evaluating training, and determine the most effective uses of computer technology for training.

In FY89, specific accomplishments included: (a) determining parameters for deciding when computer-based job aids are more cost effective than additional training, (b) determining optimal instructional sequencing and delivery strategies for computer-based training, and (c) demonstrating and evaluating methods for automating the instructional systems development process.

## PROJECT OVERVIEW

		90	91
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PROJECT: 1123	AIRCREW TRAINING TECHNOLOGY	\$ 7.6M	\$ 7.9M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop new methods and techniques for aircrew training, (b) investigate the entire spectrum of aircrew training to determine the best ways of designing, delivering and assessing ground based and aircraft training, and (c) develop flight simulator component technologies to reduce the cost of future aircrew training systems and provide new capabilities for realistic combat training.

In FY90, it is planned to: (a) demonstrate a stand-alone aircrew performance measurement system, (b) complete development of an artificial intelligence model of pilot knowledge structures, to evaluate air combat decision-making strategies and develop improved training, (c) determine the training value and optimal use of computer generated special effects, such as smoke, contrails, explosions, and sun angle shading in flight simulators, (d) define simulator display requirements for combat training with respect to color, scene content, and field-of-view, and (e) develop guidelines for the display of tactical air combat performance information for training purposes.

In FY91, it is planned to: (a) develop a model incorporating visual training effectiveness data to optimize simulator fidelity variables for aircrew training and mission rehearsal, (b) demonstrate long-distance simulator networking between the Operations Training Division at Williams AFB, the Naval Training Systems Center, and Fort Rucker, and (c) begin development of rapid database development technologies for simulator mission rehearsal.

As part of streamlining efforts, Projects 1192, "Advanced Simulation for Pilot Training" and 6114, "Flight Simulator Technology" were combined with this Project during FY89.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) reduced costs for all types of flying training, (b) improved ability to effectively train aircrew personnel, (c) new instructional methods, techniques, and devices for training and assessing pilot and navigator performance at both undergraduate and combat crew levels, (d) increased student and aircrew proficiency, (e) increased survivability and mission effectiveness, (f) development of effective visual simulation requirements, (g) improved use of simulators, and h) improved simulator displays.

In FY89, specific accomplishments included: (a) determining flight simulator critical visual cues for low-level flight and performance effects of trade-offs in scene brightness, resolution, and contrast, (b) researching scene fidelity to specify simulation requirements for ground radar resolution and infrared displays, (c) beginning a tri-Service effort to develop local and long distance communications networking standards for linking aircraft, tank, and helicopter simulators, and (d) demonstrating the feasibility to rehost high fidelity simulation and support software to microprocessor

AF/62205F

systems.

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## PROJECT OVERVIEW

		90	91
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PROJECT: 1710	LOGISTICS AND MAINTENANCE TECHNOLOGY	\$ 2.8M	\$ 3.0M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop new technologies to improve Air Force combat and peacetime operations logistics support, (b) develop improved logistics planning and assessment models for realistic computation of wartime logistics requirements and capabilities, (c) develop methods to identify trade-offs to minimize the manpower and equipment necessary to conduct aircraft maintenance in dispersed locations, and (d) develop software tools to enable weapon systems designers to design improved reliability, maintainability, supportability, and man-machine interfaces.

In FY90, it is planned to: (a) continue development of combat-portable maintenance aids, with special emphasis on providing capability for in-field training and aircraft battle damage repair estimating, (b) continue development of advanced computer-aided design graphics to allow estimation of maintainability and system operation while the system is still in the early design stages, and (c) continue development of improved simulation models to enable enhanced analysis of Air Force-wide combat logistics resource requirements.

In FY91, it is planned to: (a) develop computer-aided design tools to incorporate data on human capabilities in space into design of new systems, (b) develop advanced models to predict the impact of operational scenarios on combat logistics requirements, and (c) develop prototype training methods to enable maintenance personnel to cope with combat stress and maintain acceptable performance levels.

## PAYOFF/UTILIZATION:

The payoffs of this Project are to develop technologies for improving the logistics support of Air Force combat units. Acquisition of weapon systems that are logistically supportable, sustainable, and cost-effective is being emphasized by all levels of the Air Force and DoD. Military systems must be durable, easily maintained/repared in the field, and require little or no support equipment.

In FY89, specific accomplishments included: (a) initial development of improved, computer-based reliability and maintainability design evaluation measures and criteria for use by program directors and engineers during weapon system development, and (b) initial development of methods to identify critical maintenance tasks to be performed in emergency conditions with associated training requirements.

## PROJECT OVERVIEW

		90	91
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PROJECT: 3017	COMMAND AND CONTROL TRAINING	\$ 1.0M	\$ 1.1M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop methods for analyzing peacetime/wartime command and control (C2) job performance and training requirements, and (b) develop new training and evaluation methods for complex C2 decision making and team performance.

In FY90, it is planned to: (a) continue development of models to define and replicate tactical battle staff decision making skills, and (b) continue development of models to predict impact on training requirements and team performance of command and control system automation.

In FY91, it is planned to: (a) develop an artificial intelligence-based embedded training program for Tactical Air Control Center battle managers, and (b) continue developing improved training methods for individual and team battle management decision making.

## PAYOFF/UTILIZATION:

The payoff of this Project is, through emphasis on training, to enable optimal use of complex command and control (C2) information systems.

In FY89, specific accomplishments included: (a) developing and evaluating preliminary models to allow systems designers to predict the impacts of automation on C2 systems that were previously manual, and (b) developing a proof-of-concept rapid training system for Headquarters Pacific Air Force battle staff augmentees.

## PROJECT OVERVIEW

		90	91
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PROJECT: 7719	FORCE ACQUISITION AND DISTRIBUTION SYSTEM	\$ 2.6M	\$ 2.7M
PE: 62205F	PERSONNEL, TRAINING, AND SIMULATION		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to provide methods to ensure that the best qualified individuals are selected, classified, and assigned through the development of personnel qualification and aptitude measurement methods, job specification standards, and manpower and personnel models.

In FY90, it is planned to: (a) continue development of methods to determine the common higher order intellectual tasks from a group of related Air Force jobs to improve training effectiveness and efficiency, (b) develop methods to predict personality, motivational, and leadership qualities for officer selection/classification, (c) begin development of a transferability of skills matrix based on the ease of retraining across Air Force jobs, and (d) evaluate candidate classification models for Specialized Undergraduate Pilot Training.

In FY91, it is planned to: (a) expand previous models quantifying the value of experience to develop an objective force structure analysis model, (b) develop models to link Air Force enlisted and officer accessions and retention, and civilian availability to estimate future weapon system supportability and maintainability, and (c) begin developing a total force impact model to specify supportable manpower, personnel, and training constraints for use in early weapon system planning documents and provide criteria to weapon system developers.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) improved selection techniques, and (b) improved matching of Air Force personnel to jobs which most closely relate to their aptitudes, interests, and skills, thereby enabling Air Force managers and planners to respond in a more informed manner to dwindling manpower pools, decreased retention, budgetary constraints, and policy decisions.

In FY89, specific accomplishments included: (a) determining the ability of the various job performance measures to reliably capture the performance of technicians, (b) developing measures to predict suitability for fighter, bomber, tanker, or transport aircraft training, and (c) determining the feasibility of using the enlisted value-of-experience model for evaluating rated career fields.



## PROGRAM ELEMENT OVERVIEW

PE: 63106F                      LOGISTICS SYSTEMS TECHNOLOGY  
 CONGRESSIONAL CATEGORY:      HUMAN FACTORS  
 DoD ORGANIZATION:            AF  
 FUNDING:                      FY90 \$ 9.1M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 11.8M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element is to serve as the primary technology development effort in support of the DoD Computer-Aided Acquisition and Logistics Support (CALS) initiative. CALS will replace the current paper-based technical information system with efficient and easily updated electronic data management.

This Program Element will: (a) improve the way maintenance considerations are designed into weapons systems, (b) make engineering and maintenance data electronically available throughout the lifetime of weapons systems, (c) allow faster determination of the best balance of conflicting manufacturing and performance requirements for more reliable and supportable weapons, (d) provide more realistic computer-based logistics planning and combat capability assessment models, and (e) develop portable electronic maintenance job aids to assist maintenance technicians so that they can accomplish more kinds of diverse tasks.

This technology supports "Rivet Workforce" goals (e.g., reduce the number of maintenance specialties from 24 to 6 for the Advanced Tactical Fighter [ATF]). This is the only R&D supporting Phase III of the Air Force Technical Order Management System (AFTOMS), a \$400 million program to computerize technical data. Variations in funding levels are due to OSD directed actions.

The in-house developing organizations responsible for this program are the Air Force Human Resources Laboratory, Logistics and Human Factors Division.

## RELATED ACTIVITIES:

All Projects use applicable developments from Program Elements: #0602202F, Human Systems Technology; #0602205F, Personnel, Training and Simulation; #0603007A, Human Factors; Personnel and Training Advanced Technology; #0603205F, Aerospace Vehicle Technology; #0602201F, Aerospace Flight Dynamics; #0604740F, Computer Resource Management Technology; #0207219F, Advanced Tactical Fighter; #0604708F, Generic Integrated Maintenance Diagnostics System; #0603721N, Integrated Diagnostic Support; and #0780101F, Industrial Preparedness.

There is no unnecessary duplication of effort within the Air Force or the Department of Defense (DoD).

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include Computer-Aided Acquisition and Logistics Support (CALS) systems and technologies that will: (a) improve reliability and maintainability by enabling weapon system designers to include maintenance considerations as they create system designs on a Computer Aided Design (CAD) terminal, (b) make essential engineering and maintenance data electronically available throughout the lifetime of the system, (c) allow rapid determination of the best balance of conflicting manufacturing and performance requirements for more reliable and supportable weapons, (d) provide the ability to integrate accurate wartime logistics

data, resulting in more realistic computer-based logistics planning and combat capability assessment models, and (e) reduce the number of different kinds of maintenance specialists required to support each weapon system by using portable electronic job aids to assist individual technicians so that they can accomplish more kinds of diverse tasks.

#### FUTURE DIRECTIONS:

Beyond FY91, efforts under this Program Element will continue to develop: (a) computer models to predict requirements for people, spare parts, maintenance skills, and repair activity associated with deployment, battle damage, and intense wartime use of weapon systems, (b) Computer Aided Design (CAD) technologies, and (c) a portable computer to display instructions and fault diagnosis for maintenance technicians, and to allow replacement of the paper-based Technical Order System with a digital system.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2745	LOGISTICS FOR COMBAT	\$ 0.1M	\$ 0.1M
	READINESS MAINTENANCE		
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop computer models and training methods to accurately predict requirements for people, spare parts, maintenance skills and repair activity associated with aircraft deployment, battle damage, and intense wartime use of weapon systems.

In FY90, it is planned to work on joint Service application of the above computer maintenance model with the Army Research Institute (ARI).

In FY91, it is planned to integrate the test of above-mentioned model with Project 2950, electronic flight line maintenance aids.

## PAYOFF/UTILIZATION:

The payoffs of this Project include computer models and training methods that accurately predict the requirements for people, spare parts, maintenance skills, and repair activities that are associated with aircraft deployment, battle damage, and intensive wartime use of weapon systems.

In FY89, specific accomplishments included: (a) a transfer, directed by the Office of the Secretary of Defense, of \$2.6 million to PE #631001A, (b) transitioned computer model which predicts the impact of reduced numbers of aircraft maintenance specialties, and (c) development of training techniques for flight line emergency aircraft repairs in chemical environments.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2940	COMPUTER TECHNOLOGY FOR	\$ 3.4M	\$ 4.5M
	SYSTEMS DESIGN AND		
	MAINTENANCE		
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) develop and demonstrate Computer Aided Design (CAD) technologies which will allow designers to incorporate reliability and maintainability, and logistics considerations early in the design process, and (b) develop methods in another effort, Integrated Design Systems (IDS), to electronically capture digitized contractor design and technical information databases and use them for subsequent modification and reprourement of parts.

In FY90, it is planned to: (a) revise IDS schedule due to a \$2.0 million FY91 OSD directed budget reduction, (b) improve computer-aided maintainability design by modeling the dynamics of a maintenance technician's limbs and transfer to industry for evaluation in CAD systems, (c) conduct field test of integrated information modeling and management system components at an Air Logistics Center, and (d) demonstrate, with Army, software for mechanical design.

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved performance and maintainability trade-offs which should reduce costly redesigns and modifications, and increase supportability and operational readiness.

In FY89, specific accomplishments included: (a) developed an approved plan for digitized capture and use of technical information databases at Air Logistics Centers, (b) a joint project with Army which designed Reliability and Maintainability (R&M) trade-off analysis for mechanical systems, and (c) transitioning a computerized model of maintenance technicians to industrial sites for test and evaluation in CAD.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2950	INTEGRATED MAINTENANCE	\$ 5.6M	\$ 7.1M
	INFORMATION SYSTEM (IMIS)		
PE: 63106F	LOGISTICS SYSTEMS TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a portable computer to display instructions and fault diagnosis to flight line maintenance technicians.

This computer will allow replacement of the paper-based Technical Order system with a digital system. It will link all technical order, diagnostic (including built-in weapon system tests), training, scheduling, control, management, and supply information required by maintenance technicians. This replacement will significantly increase the productivity of maintenance and support personnel, and resiliency of maintenance organizations in combat.

In FY90, it is planned to: (a) initiate joint IMIS service test with the Navy on an F/A-18, (b) continue development of advanced display screens and components for flight line use, (c) transition final specifications for authoring and presenting aircraft technical information to Advanced Tactical Fighter (ATF) and Air Force Technical Order Management System (AFTOMS), (d) continue development of full-base level IMIS prototype incorporating supply interface, maintenance action reporting, and integrated diagnostics, and (e) continue development of joint Service specifications for pageless technical data.

In FY91, it is planned to: (a) provide functional specifications for flight line maintenance aiding system, (b) continue development of flight line maintenance aid incorporating artificial intelligence systems, and (c) continue development of IMIS functional demonstration prototype for base level field test.

## PAYOFF/UTILIZATION:

The payoff of this Project is a user-friendly, stand-alone portable computer display which is a complete system for maintenance fault diagnosis and automated maintenance instructions, that will: (a) permit replacement of the current inflexible paper-based Technical Order system with easy-to-use, interactive job guidance that is adjustable to the level of detail needed by each technician, (b) link all technical order, diagnostic (including built-in weapon system tests), training, scheduling, control, management, and supply information required by maintenance technicians, and (c) significantly increase the productivity of maintenance and support personnel and the resiliency of maintenance organizations in combat.

In FY89, specific accomplishments included: (a) a \$2.0 million OSD directed enhancement in maintenance diagnostic research and development, (b) initialized field tests of portable maintenance aiding and diagnostic technology on flight-line using the F-16, (c) preparation of specifications developed for generation, update, and presentation of pageless digital technical orders to Advanced Tactical Fighter (ATF) and Air Force Technical Order Management System (AFTOMS), (d) a program to interconnect stand-alone portable technician maintenance aids to base maintenance and supply, and (e)

development of joint Services specifications for pageless technical data.

## PROGRAM ELEMENT OVERVIEW

PE: 63227F PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY  
 CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
 EDUCATION & TRAINING  
 MANPOWER & PERSONNEL  
 DoD ORGANIZATION: AF  
 FUNDING: FY90 \$ 7.4M (FY91 PRESIDENT'S BUDGET)  
 FY91 \$ 8.2M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this Program Element (PE) is to develop and demonstrate: (a) computer-based training, authoring, and delivery systems, (b) decision-aiding systems to optimize personnel use, (c) job performance measurement technologies, (d) analytical tools to improve consideration of manpower, personnel and training in the system design process and technologies to enable realistic, small or large scale aircrew combat training.

The in-house developing organization responsible for this PE is the Air Force Human Resources Laboratory (AFHRL), and the following divisions of AFHRL: Manpower and Personnel Division, Operations Training Division, and the Training Systems Division.

## RELATED ACTIVITIES:

Related Program Elements: 0602205F, Personnel, Training, and Simulation; 0604227F, Flight Simulator Development; 0604243F, Manpower, Personnel, and Training Development.

The Air Force has formal agreements with the Army for visual display and computer image generation technology, and with the Army and the Navy to share ICAT technologies. The Navy has a liaison office at Air Force Human Resources Laboratory (AFHRL), Operations and Training Division.

No unnecessary duplication of effort is created by this PE within the Air Force or DoD.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) improved aircraft simulation image generation and display systems, (b) improved tests for selecting, classifying, and assigning quality personnel to jobs, (c) improved technical training systems to increase the efficiency and productivity of personnel, and (d) improved estimations of manpower, personnel, and training requirements for improved weapon system design and support.

## FUTURE DIRECTIONS:

Major thrusts for this Program Element, in FY91 and beyond, will continue in the areas of: (a) for the Aircrew Combat Mission Enhancement (ACME), work on the Fiber-Optic Helmet-Mounted Display (FOHMD), the two versus many aircrew combat training system, and the dome display, (b) for the Manpower and Force Management, work on computer adaptive occupational survey techniques, predictors for on-the-job performance, and job performance measurement system development, and (c) for Training Systems Development, work on the Avionics Job Family Trainer, the Mechanical Extended Job Family Trainer, and the Intelligent Computer-Assisted Training (ICAT) effort.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2743	AIRCREW COMBAT MISSION ENHANCEMENT (ACME)	\$ 4.0M	\$ 4.4M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to advance tactical flight simulation by developing, demonstrating and evaluating a simulator-based air combat training system to provide an affordable, effective, and realistic adjunct to flight-based aircrew combat training.

A paramount objective of today's Tactical Air Forces is training for combat. Unfortunately, operational air combat training is severely constrained by a number of cost, safety, technical, and security restrictions. The impact of these restrictions is that training objectives involving combinations of multiple enemy and friendly aircraft, ground threats, electronic countermeasures, and variations in weather and terrain are difficult or impossible to accomplish in the aircraft. Aircrew Combat Mission Enhancement (ACME) will develop, demonstrate and evaluate an air combat situational awareness training system to enable affordable, effective, and realistic aircrew combat mission training. This system will consist of a local area network of high-, medium-, and low-fidelity flight simulators and operator control stations. The network will enable scenarios with up to 14 live participants, and have the capacity for long distance networking to other simulation facilities. Off-the-shelf hardware and research prototypes will be integrated, and new technologies will be developed to provide a dynamic environment for training the full spectrum of combat tasks. Key technologies to be developed include: (a) cost effective enemy threat systems simulations, (b) wide field-of-view, high-resolution visual displays, (c) low-cost adversary control stations, and (d) more capable instructor/mission control stations. Behavioral experiments will evaluate the fidelity requirements for individual components within the network, scenario complexity and realism requirements for effective training, the proper mix of high-, medium-, and low-fidelity/cost devices, and the training value of many-on-many versus single-, two-, or four-ship training. These demonstrations will help define simulator requirements to meet critical Tactical AF needs.

Beginning in FY90, as part of streamlining efforts, Project 2363, "Personnel, Training, and Simulation technology, " was merged with this Project.

In FY90, it is planned to: (a) demonstrate the two versus four aircrew combat training system, (b) develop improved threat/weapons simulations for training, and (c) install the prototype dome display system in the lab.

In FY91, it is planned to: (a) complete image resolution enhancements for the FOHMD, (b) demonstrate the prototype two versus many aircrew combat training system, and (c) determine the training effectiveness of the dome display.

## PAYOFF/UTILIZATION:

The payoff of this Project involves the advancement of flight simulation concepts through the development of advanced training technologies for tactical aircraft, using multisensor, multicockpit combat mission simulators



with advanced display capabilities.

This application of advanced simulator technologies at both training center and operational unit levels will lead to improved sustained aircrew readiness. It will significantly extend the range of training tasks that can be successfully accomplished in simulators.

In FY89, specific accomplishments included: (a) start of refinements to the FOHMD to improve image resolution, and (b) integration of two FOHMDs with four low fidelity pilot/operator stations to create the initial training system.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2922	MANPOWER AND FORCE MANAGEMENT	\$ 1.1M	\$ 1.4M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to provide technology to enable the Air Force to meet its manpower needs for combat readiness and sustainability.

As mandated by Congress, cost-effective methodologies for task-level measurement of on-the-job performance will be developed and demonstrated to enable validation of enlistment selection and classification standards, and will relate those standards to job requirements. This Project will develop tools and methods to enhance the consideration of manpower, personnel, and training factors early in the system design and acquisition process.

In FY90, it is planned to: (a) begin development of automated procedures for matching comparable weapon system task data for design of new systems, (b) continue development and evaluation of low cost job performance measurement methodologies, (c) demonstrate the effectiveness of biographical data to augment current selection and classification measures, and (d) begin development of automated procedures for clustering tasks into efficient jobs or training modules.

In FY91, it is planned to: (a) develop computer adaptive occupational survey techniques, (b) develop and evaluate predictors of on-the-job performance as related to Air Force enlistment standards, and (c) develop guidelines and specifications for operational development of job performance measurement systems.

## PAYOFF/UTILIZATION:

The payoff of this Project is technology to enable the Air Force to meet its manpower needs for combat readiness and sustainability and to measure individual job performance.

In FY89, specific accomplishments included the determining of value added by job performance information for selection and classification.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2949	TRAINING SYSTEMS DEVELOPMENT	\$ 2.4M	\$ 2.4M
PE: 63227F	PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AIR FORCE HUMAN RESOURCES LABORATORY		

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PROJECT SYNOPSIS:

The objective of this Project is to develop computer-based training systems to train basic job skills and thus bring the first-term airman to a functional level faster.

Modern high technology systems have relieved the human from performing many of the routine diagnostic and repair tasks that enabled the novice to gain knowledge of the systems, and making it difficult to obtain the necessary job experiences for growth from novice to expert. This Project will: (a) develop computer-based training systems to replace that lost experience, and (b) develop and demonstrate software to enable Air Force training developers to rapidly and inexpensively build Intelligent Computer-Assisted Training (ICAT) systems. ICAT systems act like a human tutor, continually evaluating and interacting with the student to deliver more individualized and effective training.

In FY90, it is planned to: (a) complete the Avionics Job Family Trainer, (b) develop a Mechanical Job Family Trainer for F-15 mechanics, hydraulics specialists, and crew chiefs, (c) demonstrate an ICAT rapid prototyping capability for evaluating ICAT designs and applications, and (d) evaluate the utility of incorporating high fidelity equipment or system simulations within ICAT systems.

In FY91, it is planned to: (a) accomplish a field evaluation of the Avionics Job Family Trainer, (b) complete the Mechanical Job Family Trainer, (c) determine the hardware and software requirements for cost effective and user friendly ICAT development, and (d) determine which instructional strategies provide the best training in ICAT applications.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) a reduction in the number of marginal performers, and (b) reduction in overall on-the-job training time.

Air Force decision makers will be provided with scientifically valid, job-oriented, measurement and training, to ensure that airmen possess the basic job knowledge and skills needed to perform and progress satisfactorily during the first term of enlistment.

In FY89, specific accomplishments included: (a) developing the Avionics Job Family Trainer to train expert skills common to three Air Force F-15 avionics specialties, and (b) beginning the software design and development for the rapid prototyping testbed for ICAT systems.

## PROGRAM ELEMENT OVERVIEW

PE: 63231F CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY  
 CONGRESSIONAL CATEGORY: HUMAN FACTORS  
 DoD ORGANIZATION: AF  
 FUNDING: FY90 \$ 5.6M (FY91 PRESIDENT'S BUDGET)  
 FY91 \$ 5.3M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of the Manpower, Personnel and Training (MPT) portion of this Program Element is to provide advanced development and demonstration of concepts to protect and extend the performance of the crew member in the hazardous aerospace environment.

The program applies primarily to aircrews, but some applications extend to groundcrews conducting flightline operations. Specific projects include human factors considerations in the design of cockpits that significantly improve combat effectiveness, and that also improve the protective features of air and groundcrew life support equipment. All demonstrated concepts in this Program Element will feed into full-scale development programs to address fifteen documented needs from USAF commands which require specific warfighting capabilities.

This program is managed through six advanced technology transition demonstrations, and thirteen smaller technical demonstration efforts. Project names were changed to reflect program content; no changes were made in content.

The in-house developing organization responsible for this program is the Human Systems Division, Deputy Commander, Development and Acquisition, with the assistance from its laboratories, the United States Air Force School of Aerospace Medicine, the Air Force Human Resources Laboratory and the Armstrong Aerospace Medical Research Laboratory; and through memoranda of agreement with other laboratories, divisions and commands, Services and agencies.

## RELATED ACTIVITIES:

All projects use applicable technologies from Program Element #0602202F, Human Systems Technology. Program Element #0603205F, Aerospace Vehicle Technology, provides matrixed manning for development of pilot/vehicle interface technologies and simulation capabilities. Program Element #0603745F, Chemical Warfare Defense, funded Project 2722, Biomedical Chemical Warfare Defense, in FY87 before being rolled into Program Element #0603231F. Successfully demonstrated concepts from this program that meet Air Force needs are transitioned to Program Elements #0604706F, Life Support System, and #0604703F, Aeromedical/Chemical Defense Systems.

There is no unnecessary duplication of effort within the Air Force or the Department of Defense. Products are provided to Aeronautical Systems Division (ASD), Human Systems Division (HSD), Electronic Systems Division, Space Division, and others via technology transition agreements.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include advances in crew systems technology which will increase aircrew performance and protection in the hazardous aerospace environment.

Maximizing the decision-making ability and performance of, and sustaining and protecting, pilots and aircrews is vital for maintaining a combat-effective aeronautical force. The inability of the system operator to sufficiently perceive, decide, and act upon information, and many other mental and physical demands, may diminish aircrew performance, endanger aircrew safety, or decrease survivability. These limit, or preclude the successful use of, a pilot's tactical skills in combat situations and, ultimately, the potential for combat mission success. Work under this Program Element will result in the reduction or elimination of such threats and limits.

#### FUTURE DIRECTIONS:

Beyond FY91, plans are to continue efforts in the design of cockpits that significantly improve combat effectiveness and air and groundcrew life support equipment.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2029	COCKPIT AUTOMATION TECHNOLOGY (CAT)	\$ 4.9M	\$ 4.1M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a traceable crew system design and development process along with computer analysis, design, and test software tools.

This Project: (a) integrates systems and human factors principles early in the acquisition cycle for manned aerospace vehicles, (b) predicts pilot performance and mission success as functions of automation as referenced to a well-understood baseline weapon system, (c) quantifies human/system trade-offs, and (d) verifies projected performance and crew workload using contractor's simulators. New test and evaluation methods assure the best use of costly mission simulation during all weapon system acquisition phases. Last minute cockpit redesigns can be reduced or avoided altogether.

In FY90, it is planned to: (a) continue demonstration to validate new cockpit process, design tools and application to fighter mission, and (b) integrate and test a breadboard cockpit simulator as rapid prototyping test article, for real-time cockpit evaluation.

In FY91, it is planned to: (a) continue validation of cockpit process, complete design guide, (b) complete design guide for implementing cockpit automation, and (c) prototype the performance and workload evaluation system.

## PAYOFF/UTILIZATION:

The payoffs of this Project include the publication and distribution of military standards, design handbooks, and extensive computer-assisted procedures to the military services, National Aeronautics and Space Administration (NASA), and contractors, for use early in the design process to determine the cost-effective design of aircrew training needs.

The early application of this crew system design process will reduce system program costs and risks associated with engineering change proposals and retrofits stemming from the limited design insight available from currently used techniques.

In FY89, specific accomplishments included: (a) defining a comprehensive crew system process, support tools, (b) testing initial cockpit CAD-CAE design support system, (c) establishing transition method to make CAT data and software available via new DLA information analysis center, and (d) application analysis to a notional strategic crew system.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2992	SPACE CREW ENHANCEMENT (SPACE)	\$ 0.7M	\$ 1.2M
PE: 63231F	CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY		
CONGRESSIONAL CATEGORY:	HUMAN FACTORS		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	AEROSPACE MEDICAL DIVISION		

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PROJECT SYNOPSIS:

This Project develops specialized crew protection systems and man-machine integration needed to support possible military missions from space.

Efforts will improve crew performance and protection in environments unique to military space systems. Near-term efforts support the Air Force Space Command's Military-Man-in-Space program. This support involves measuring a human's visual ability in identifying military ground targets from space. Experiments onboard the space shuttle are being conducted to collect the visual performance data.

In FY90, it is planned to integrate the telescope for a shuttle flight test via the Space Test Program (Number 1 secondary payload).

In FY91, it is planned to: (a) identify crew station design criteria and advanced technologies for manned military space systems, and (b) initiate development on ensemble subsystems (gloves and joints) for transatmospheric missions.

## PAYOFF/UTILIZATION:

The payoffs of this Project include to: (a) a define of man's potential roles in military space systems, including his ability to successfully perform projected military missions, (b) analyze the trade-offs of manned versus unmanned space systems, (c) develop technologies, in the near term, to support and enhance crew effectiveness in the development of transatmospheric vehicles with potential different launch and egress response times, flight durations, acceleration profiles, performance characteristics, and operator workload and task requirements than the space shuttle, and (d) design effective future systems, optimally utilizing man's abilities, and of subsystems to protect man and further extend the system's capabilities in the long term.

In FY89, specific accomplishments included the completion of ground tests of the space telescope.

## PROGRAM ELEMENT OVERVIEW

PE: 64227F                      FLIGHT SIMULATOR DEVELOPMENT

CONGRESSIONAL CATEGORY:      SIMULATION & TRAINING DEVICES  
                                 EDUCATION & TRAINING

DoD ORGANIZATION:            AF

FUNDING:                      FY90 \$ 58.2M (FY91 PRESIDENT'S BUDGET)  
                                 FY91 \$ 41.2M (FY91 PRESIDENT'S BUDGET)

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PE SYNOPSIS:

The objective of this Program Element is to provide for development of aircrew and maintenance training techniques and devices.

This Program Element funds efforts to: (a) adapt simulation technology and standards developed in the laboratories and industry for satisfying current training requirements, and (b) develop prototype training devices. Prototype training devices and subsystems developed under this Program Element will be evaluated for training effectiveness and supportability prior to follow-on production decisions and/or acquisition.

The in-house developing organization responsible for this program is the Deputy for Training Systems.

## RELATED ACTIVITIES:

There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

For the Standard DoD Simulator Database/Common Transformation Program, related activities include Rome Air Development Center (RADC) Cartographic Applications for Tactical and Strategic Systems (CATSS) Program (Program Element 0603227F). This Project (Project 2851) is a joint-Service Project conducted under the Joint Logistic Commanders (JLC) through the Joint Technical Coordinating Group for Training Systems and Devices.

## PAYOFF/UTILIZATION:

The payoffs of this Program Element include: (a) lower costs of training and greater training safety, efficiency, and effectiveness through adaptation of flight simulation technology to today's complex aircraft, (b) improved supportability and effectiveness of flight simulators in the field, (c) improved training for Weapon System Operators, (d) reduced costs and improved deliverability of simulators through simulator modularity design and development of a Standard DoD simulator database that uses Defense Mapping Agency (DMA) data for displays for aircrew training, (e) improved reliability and maintainability of both existing and planned flight simulators, (f) elimination of training deficiencies through provision of the Advanced Training System, and (g) improved support for operations personnel assigned to the Advanced Tactical Fighter (ATF) through the development of the ATF training system.

## FUTURE DIRECTIONS:

Beyond FY91, efforts under this Program Element will continue to: (a) identify and correct deficiencies in current training capabilities, (b) improve cost effectiveness, safety, and reliability of flight simulators, (c) develop courseware for a C-130 aircrew training system (ATS), (d) develop a standard DoD digital database library, (e) develop a MIL-STD for flight



simulator software modules, (f) promote efficient training methods, (g) provide the logistics support for all ATS related training equipment, and (h) examine life cycle cost effectiveness of critical manpower, personnel and training resources.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2325	SIMULATOR DEVELOPMENT	\$ 2.9M	\$ 3.5M
	ACTIVITIES		
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) provide funds to conduct engineering development of new aircrew/maintenance training technologies and standards, (b) fund the pre-production of first article training devices to satisfy the customer's training requirements, (c) identify and correct deficiencies in current training capabilities, and (c) develop tools that improve aircraft/simulator concurrency and reduce system life cycle costs.

In FY90, it is planned to: (a) develop software system to support instructors, (b) develop a standard format for technical and aircraft performance data use in simulator development, and (c) identify maintenance training requirements.

In FY91, it is planned to: (a) determine flight simulator motion requirements and develop algorithms for the simulator drive mechanism, (b) complete development of next generation motion/force cuing module, (c) complete full field of view dome training effectiveness research tool development, and (d) complete second generation low cost, lightweight helmet coupled image generation and projection device.

## PAYOFF/UTILIZATION:

The payoffs of this Project include lower costs and improved training effectiveness through the adaptation of flight simulation technology to today's complex aircraft.

In FY89, specific accomplishments included: (a) G-seat algorithms for providing more effective flight motion in the simulator, and (b) maximum tolerable induced time delays.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2769	SIMULATOR UPDATE DEVELOPMENT/SIMULATOR REQUIREMENTS DEFINITION	\$ 6.9M	\$ 1.6M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to update training systems to maintain and improve their supportability and effectiveness.

Updates to these systems include courseware development for a C-130 Aircrew Training System (ATS). After the completion of the C-130 ATS in FY90, this Project will be used to: (a) define requirements for new training systems in the form of tasks to be trained (this supports a milestone decision), (b) develop options to meet the requirements (this supports a milestone 1 decision, and (c) build a prototype of one or more of the options to evaluate the training effectiveness of those options.

In FY90, it is planned to: (a) conduct C-130 ATS summative evaluation, and (b) complete C-130 ATS readiness review in Aug 90.

In FY91, it is planned to: (a) conduct Joint Primary Aircrew Training Systems (JPATS) training requirements analysis, (b) conduct Joint Combat Training System (JCATS) training requirements analysis, and (c) develop and evaluate prototypes for the European Low Altitude Training System (ELATS).

## PAYOFF/UTILIZATION:

The payoffs of this Project include improved supportability and effectiveness of light simulators in the field.

In FY89, specific accomplishments included the completion of C-130 ATS course readiness reviews.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2851	STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/COMMON TRANSFORMATION PROGRAM	\$ 2.6M	\$ 2.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this joint-development Project, initiated through the Joint Logistics Commanders, is to develop a standard DoD digital database library, enhancement and exchange standards, and a distribution system. This minimizes database redundancy among the services and maximizes database interoperability.

In FY90, it is planned to: (a) perform acceptance testing of the development system, (b) perform the interim production and exercise validation option, and (c) add rapid database generation capability to system.

In FY91, it is planned to: (a) test and accept turn-key production capability in May 91, and (b) complete rapid database generation capability.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) elimination of problems and expenses associated with proliferation of unique transformation programs and periodic updates (due to specification and requirements changes) by developing a Defense Mapping Agency (DMA) database for transformation programs, (b) assistance in achieving transportability (e.g., transportable database between trainers), and (c) reduced costs for future systems.

In FY89, specific accomplishments included: (a) critical design review, (b) produced prototype database, and (c) test readiness review.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2901	B-1B WEAPON SYSTEM TRAINER (WST)	\$ 3.0M	\$ 3.4M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop an aircrew training device for all B-1B crew members to include mission rehearsal for takeoff and landing, navigation, air refueling, threat analysis/countermeasures, low-level penetration, weapons delivery, and emergency procedures.

In FY90, it is planned to: (a) deliver updated Integrated Logistic Support (ILS), Aero package, and Block 3.5 on the Cockpit Procedure Trainer (CPT), (b) complete DT&E and IOT&E of WST and MT (Mission Trainer), and (c) complete WST design on Block 3.5/4.5 software updates.

In FY91, it is planned to: (a) complete testing on Block 3.5/4.5 updates for WST and MT, (b) deliver updates for aerodynamics on WST, (c) deliver Block 3.5/4.5 updates for WST and MT, and (d) complete system verification tests on Block 4.5 for CPT.

## PAYOFF/UTILIZATION:

The payoff of this Project includes the development of a training system to meet the training needs of all B-1B crew members.

In FY89, specific accomplishments included: (a) accepting six Cockpit Procedures Trainers (CPTs), and (b) completing design test and evaluation for software support center.

## PROJECT OVERVIEW

		90	91
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PROJECT: 2968	MODULAR SIMULATOR DESIGN	\$ 1.5M	\$ 1.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to develop a MIL-STD for flight simulator software modules.

Standardizing the functions of each simulator module and its interfaces to all other modules (in the Ada programming language) will: (a) allow the use of software from one simulator to the next and (b) simplify the job of updating module software to maintain simulator concurrency with aircraft.

In FY90, it is planned to: (a) conduct Critical Design Review (CDR), (b) complete draft military standard for modular simulators, and (c) develop modular simulator software.

In FY91, it is planned to: (a) demonstrate modular simulator architecture concept and validate on the testbed simulator, and (b) publish modular standard and incorporate in testbed simulator and future acquisitions.

## PAYOFF/UTILIZATION:

The payoffs of this Project include: (a) reduced simulator life-cycle cost, (b) reduced development lead time, (c) improved ability to deliver simulators to the field concurrently with the aircraft, and (d) an increased competitive contractor base, through a modular systems design approach to simulators.

In FY89, specific accomplishments included: (a) fabricating the Modular Validation test bed, (b) establishing Functional Baseline Requirements, (c) performing the Preliminary Design Review (PDR), and (d) defining the interfaces.

## PROJECT OVERVIEW

	90	91
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PROJECT: 2998	LOW ALTITUDE NAVIGATION \$ 1.2M	\$ 0.0M
	AND TARGETING INFRARED	
	SYSTEM FOR NIGHT	
	(LANTIRN) SIMULATOR	
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	SIMULATION & TRAINING DEVICES	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS	

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PROJECT SYNOPSIS:

The objective of this Project is to develop a LANTIRN simulator which, when integrated with an Operational Flight Trainer (OFT), provides the capability to fully train pilots in high-threat, night, adverse weather, heavily-task-loaded, environment-simulating combat.

Tactical Air Command (TAC) needs a safe, efficient means of training the LANTIRN mission in the high-threat, adverse weather, heavily task loaded environment-simulating combat. The complexity and inherent danger of operating the LANTIRN system requires part-task trainers (Project 2999, LANTIRN Part Task Trainer) for initial switchology training and F-16 and A-10 Operational Flight Trainers (OFTs) with LANTIRN simulation capability for full mission training.

The "core" LANTIRN simulator will include a computer image generation (CIG) system for the navigation pod and a higher resolution simulation capability for target recognition and weapons delivery tasks. An F-15E, F-16, and A-10 configured Part Task Trainer will be developed for switchology, modology, and symbology training at the combat crew training squadron.

In FY90 plans are to complete the manufacture, delivery, and acceptance test, and close this Project.

## PAYOFF/UTILIZATION:

The payoff of this Project includes safe, efficient training for aircrews to accomplish the LANTIRN mission in the high-threat, realtime, heavily-loaded task environment that is encountered when employing the LANTIRN system.

In FY89, specific accomplishments included: (a) integration of the hardware and software, (b) performing contractor tests and Air Force development tests, (c) integration of the simulator with the F-16 OFT, and (d) completion of reliability tests and training readiness.

## PROJECT OVERVIEW

		90	91
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PROJECT: 3135	ADVANCED TRAINING SYSTEM (ATS)	\$ 5.2M	\$ 8.3M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is to provide a computer-based training system, the Advanced Training System (ATS), to alleviate various training deficiencies.

Changes to the Air Force training environment have resulted in increased training workload at the Air Training Command (ATC) Technical Training Centers. Increasing equipment complexity, together with greater student instructional needs, combine to heavily tax ATC's instructor resources. With increased emphasis on sortie generating skills and the need to train on more complex material in the electronic and mechanical fields, ATC has been increasingly unable to conduct remedial or individual instruction. In view of today's current efficiencies in automated support, computer-based instruction and computer-based management, the manual ATC system is becoming increasingly inefficient and inflexible. Without this system, a proliferation of discrete systems will continue to be acquired that are more costly and less efficient than the ATS. ATS will support all four major functions in the Technical Training arena: instructional development, delivery, evaluation, and management. Its main goals are to: (a) free instructors for individualized instruction in complex, highly technical tasks, (b) promote efficient training methods, and (c) provide rapid course creation and updating.

In FY90, it is planned to: (a) perform Preliminary Design Review (PDR), (b) perform Software Specification Review, and (c) update life cycle cost estimate and cost/benefits analysis.

In FY91, it is planned to: (a) perform Critical Design Review (CDR) and (b) start Development, Test and Evaluation (DT&E) in June 91.

## PAYOFF/UTILIZATION:

The payoffs for this Project include: (a) a remedial training capability, (b) more effective instruction, (c) decreased training time, (d) more effective use of instructors, (e) earlier detection of problems, (f) cost savings, and (g) flexibility under surge.

In FY89, specific accomplishment included awarding FSED contract to IBM Corp., Manassas, VA. in May 89.



## PROJECT OVERVIEW

		90	91
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PROJECT: 3282	C-17 AIRCREW TRAINING SYSTEM (ATS)	\$24.3M	\$ 8.1M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is designed to meet the needs of the Military Airlift Command (MAC), and the Air Force Reserve (AFRES) in supplying the initial and continuation training for C-17 aircrew members.

Training will be totally contractor administered and supported, with MAC evaluating the final product - a fully qualified aircrew member. There will be training facilities at four active duty bases and four Air Reserve Component bases for continuation training. Emphasis will be on integrated crew training and training tasks that cannot be accomplished in aircraft, including those related to safety of flight, emergency procedures, and others for which a suitable flight training environment does not exist. The training system will be developed concurrently with the aircraft development and production efforts, allowing the first Main Operating Base (MOB) to be available for training at the initial squadron.

In FY90, it is planned to: (a) conduct Preliminary Design Review (PDR), (b) conduct Critical Design Review (CDR), and (c) initiate development of courseware.

In FY91, it is planned to: (a) begin fabrication of training devices and (b) complete courseware development.

## PAYOFF/UTILIZATION:

The payoff of this Project will be improved continuation training and mission/upgrade training for C-17 crew members, through the development of a centralized training facility, and development of learning centers at each of four operational wings and two reserve sites.

In FY89, specific accomplishments included: (a) downselecting from three to one contractor and (b) continuing full scale development effort.

## PROJECT OVERVIEW

		90	91
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PROJECT: 3772	C-141 AIRCREW TRAINING SYSTEM (ATS)	\$10.2M	\$13.0M
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS		

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PROJECT SYNOPSIS:

The objective of this Project is a totally contracted effort for the ground and flight simulation aircrew training programs, including initial qualification, upgrade and continuation training, for all HQ MAC, HQ AFRES and ANG C-141 primary crew members. The system will also include the Basic Flight Engineer School at Altus AFB.

The contractor will also provide for the logistics support of all ATS associated training equipment, and operate a training management system to track student progress, update the training programs, and interface with Air Force Operations Resource Management System. The ATS will be conducted on site at a C-141 operating locations, active and Air Reserve Components.

In FY90, it is planned to: (a) conduct Training System Review #1, (b) begin courseware development, and (c) conduct Training System Review #2.

In FY91, it is planned to: (a) begin course readiness reviews, (b) deliver prototype training equipment, and (c) conduct training validation.

## PAYOFF/UTILIZATION:

The payoff of this Project includes the development of training courses for both ground and flight crews, and a training management system to track student progress.

In FY89, specific accomplishments included: (a) awarding full scale development contract with options for operation and maintenance support, (b) beginning training System Requirements Analysis (SRA), and (c) beginning media design/development.

## PROJECT OVERVIEW

	90	91
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PROJECT: 3775	MANPOWER, PERSONNEL, AND \$ 0.4M	\$ 0.4M
	TRAINING (MPT)	
PE: 64227F	FLIGHT SIMULATOR DEVELOPMENT	
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL	
DoD ORGANIZATION:	AF	
RESPONSIBLE ORGANIZATION:	DEPUTY FOR TRAINING SYSTEMS	

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PROJECT SYNOPSIS:

The objective of this Project is to provide for the front-end analyses and studies to ensure Manpower, Personnel, and Training (MPT) factors and constraints are developed during the early phases of the weapon system acquisition process (WSAP).

This Project will establish the needed data sources, analytical tools, and procedures which support MPT trade-off analysis in the design. These analyses will emphasize life-cycle, cost-effective use of critical MPT resources.

In FY90, it is planned to: (a) develop an MPT Education Course, (b) initiate MPT studies and development of MPT models, and (c) begin development of the MPT Computer Supported Network Analysis System (CSNAS) prototype.

In FY91, it is planned to: (a) develop an MPT educational course, (b) evaluate MPT models development, (c) develop MPT job aids and Measures of Effectiveness (MOE), and (d) continue development of CSNAS.

## PAYOFF/UTILIZATION:

The payoff of this Project is the establishing of needed data sources, analytical tools, and procedures which will support MPT trade-off analyses in the early phases of weapon system design.

This is a new Project start in FY90.

## PROGRAM ELEMENT OVERVIEW

PE: 64243F                      MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT

CONGRESSIONAL CATEGORY:      MANPOWER & PERSONNEL  
                                  EDUCATION & TRAINING  
                                  HUMAN FACTORS

DoD ORGANIZATION:            AF

FUNDING:                      FY90 \$ 4.4M (FY91 PRESIDENT'S BUDGET)  
                                  FY91 \$ 3.5M (FY91 PRESIDENT'S BUDGET)

## PE SYNOPSIS:

The objective of this new-start Program Element is to provide engineering development to ensure transition of maturing manpower, personnel, and training (MPT) technologies from Air Force (AF) laboratories and fielding of MPT systems which are logistically supportable by the operational forces.

Historically, transition of MPT technologies to operational users has been ineffective, due to lack of a formal program. This Program Element will solve this problem and provide field technologies to improve the effectiveness of AF training development/delivery, performance assessment, personnel acquisition, job assignment, force management, and human performance in weapon systems.

The in-house developing organization responsible for this program is the Human Systems Division.

## RELATED ACTIVITIES:

Related Program Elements are: 0601102F, Defense Research Sciences; 0602205F, Personnel, Training and Simulation; 0603227F, Personnel, Training and Simulation Technology; 0602233N, Mission Support Technology: Personnel, Training and Simulation Technology Area; 0602234N, Systems Support Technology: Human Factors Technology Area; 0603733N, Training Devices Technology; 0603720N, Education and Training; 0603707N, Manpower and Personnel Systems Development; 0604703N, Training and Personnel Systems Development; 0602716A, Human Factors Engineering Technology Development; 0602727A, Non-System Training Devices Technology; 0602785A, Manpower, Personnel, and Training Technology; 0603007A, Human Factors, Personnel, and Training Advanced Development; 0804748F, Flight Screening.

There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

## PAYOFF/UTILIZATION:

The payoffs anticipated from this Program Element will be more accurate selection and classification of individuals in the U.S. Armed Forces and will ensure an improved match of the individual's aptitudes with those of the job requirements.

This Program Element is a new start in FY90.

## FUTURE DIRECTIONS:

Beyond FY91, efforts under this Program Element will continue to improve: (a) effectiveness of training development, (b) cost effectiveness/efficiency of training delivery to the operational forces, and (c) effectiveness of manpower selection and classification through development of a computerized

testing device and computer-based battery of tests.

## PROJECT OVERVIEW

		90	91
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PROJECT: 3816	PILOT SELECTION AND CLASSIFICATION SYSTEM (PSACS)	\$ 3.9M	\$ 2.8M
PE: 64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	MANPOWER & PERSONNEL		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objective of this Project is to design, develop, validate, and produce a specialized computerized testing device and computer-based battery of tests designed to predict which candidates will be successful in training and follow-on aircraft assignment.

The Air Force has always desired the ability to select pilot candidates who have the best chance for completing pilot training. Small reductions in the attrition rate can save millions of dollars each year as well as increase the number of pilots. Further, an additional capability is needed to predict the probability of success in specific types of aircraft. This capability supports Specialized Undergraduate Pilot Training (SUPT) which will provide basic pilot training in T-37 aircraft and allow immediate specialized training in T-38 aircraft for Fighter-Bomber pilots and in business jet trainers for Tanker-Transport pilots.

In FY90, it is planned to: (a) begin full scale development of the Pilot Selection and Classification System (PSACS) based upon technology developed by the Air Force Human Resources Laboratory (AFHRL) in PE #0602205F and PE #0603227F, (b) begin software coding of the selection test battery, and (c) produce prototype test devices to verify that the new design is capable of producing valid predictions of success.

In FY91, it is planned to: (a) complete full scale development of the PSACS, (b) integrate a validated specialized pilot training predictor into the test battery, (c) conduct operational testing and evaluation of the PSACS, (d) set up an operational support center to maintain the system and provide software support, and (e) begin production of the PSACS test devices (funded in PE #080478F).

## PAYOFF/UTILIZATION:

The payoffs of the Project include: (a) increased ability for the Air Force to meet its manpower needs for combat readiness and sustainability, (b) reduced attrition in pilot training, (c) a more efficient use of training aircraft, and (d) greater job satisfaction.

This is a new Project start for FY90.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 3817	FORCEWIDE TRAINING SYSTEMS	\$ 0.5M	\$ 0.7M
PE: 64243F	MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	AF		
RESPONSIBLE ORGANIZATION:	HUMAN SYSTEMS DIVISION		

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PROJECT SYNOPSIS:

The objectives of this Project are to: (a) capitalize on the advances in intelligent computer-aided instruction and computer engineering, and (b) focus on cost-effective, efficient delivery of training to the operational forces.

New and increasingly complex weapon systems and rapidly changing technology are vastly increasing Air Force training requirements, while training resources remain relatively fixed. Personnel programs, such as "Rivet Workforce", which combine related AF specialties further increase training requirements. This requires the Air Force to rely more heavily upon on-the-job training and more efficient methods of training.

In FY90, it is planned to: (a) begin full-scale development of an AF advanced on-the-job training system based upon the results of the Advanced Technology Development Project in PE 0630227F, Personnel, Training, and Simulation Technology (Project 2557), and (b) begin full-scale development of F-15 Avionics Troubleshooting Tutors for the Tactical Air Command based upon the results of the Advanced Technology Demonstration Project in PE 0603227F, Personnel, Training, and Simulation Technology (Project 2949).

In FY91, it is planned to: (a) conduct critical design review of F-15 Avionics Troubleshooting Tutors (ATT), (b) conduct critical design review of the advanced on-the-job training system, and (c) begin fabrication of F-15 ATT.

## PAYOFF/UTILIZATION:

The payoffs of this Project will include: (a) increased efficiency in training methods, and (b) more cost-effective delivery of training for the operational Air Force.

This Project is a new start for FY90.

III-C-1: LISTING OF AIR FORCE PROJECTS

TOTAL FUNDING IN PROGRAM ELEMENT 61102F :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	8.761	9.289

(CONTINUED)



III-C-1: LISTING OF AIR FORCE PROJECTS

TOTAL FUNDING IN PROGRAM ELEMENT 62202F :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	11.978	12.005

(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-ET	AFHRL	2.600	2.800	ET	V A R	LABORATORY SUPPORT
06HT-HF	AFHRL	2.700	3.100	HF	V A R	LABORATORY SUPPORT
06HT-MP	AFHRL	3.600	3.900	MP	V A R	LABORATORY SUPPORT
06HT-ST	AFHRL	2.900	3.400	ST	V A R	LABORATORY SUPPORT
1121	AFHRL	2.334	2.621	ET	6	TRAINING DEVELOPMENT AND ASSESSMENT TECHNOLOGY
1123	AFHRL	7.614	7.924	ET	6	AIRCREW TRAINING TECHNOLOGY
1710	AFHRL	2.822	2.950	HF	4	LOGISTICS AND MAINTENANCE TECHNOLOGY
3017	AFHRL	1.043	1.072	ET	6	COMMAND AND CONTROL TRAINING
7719	AFHRL	2.556	2.741	MP	2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
		----- 28.170	----- 30.509			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 62205F :						FY90 ----- 28.169
THE PRESIDENT'S BUDGET, JANUARY 1990						FY91 ----- 30.508

(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.075	0.100	HF	4A	LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	3.429	4.528	HF	4D	COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN AND MAINTENANCE
2950	AFHRL	5.610	7.130	HF	4D	INTEGRATED MAINTENANCE INFORMATION SYSTEM (IMIS)
		----- 9.115	----- 11.759			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63106F :						FY90 ----- 9.114
THE PRESIDENT'S BUDGET, JANUARY 1990						FY91 ----- 11.758

(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2743	AFHRL	3.991	4.430	ST	6	AIRCREW COMBAT MISSION ENHANCEMENT (ACME)
2922	AFHRL	1.054	1.382	MP	2	MANPOWER AND FORCE MANAGEMENT
2949	AFHRL	2.375	2.386	ET	6	TRAINING SYSTEMS DEVELOPMENT
		----- 7.421	----- 8.198			TOTAL IN PE
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :						FY90      FY91 ----- 7.420      8.198
THE PRESIDENT'S BUDGET, JANUARY 1990						

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(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63231F						CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	AMD	4.926	4.100	HF	4	COCKPIT AUTOMATION TECHNOLOGY (CAT)
2992	AMD	0.685	1.200	HF	4	SPACE CREW ENHANCEMENT (SPACE)
		----- 5.612	----- 5.301			TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 63231F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	----- 5.611	----- 5.300

(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
2325	TS SPO	2.846	3.500	ST	6	SIMULATOR DEVELOPMENT ACTIVITIES
2769	TS SPO	6.850	1.550	ST	6	SIMULATOR UPDATE DEVELOPMENT/SIMULATOR REQUIREMENTS DEFINITION
2851	TS SPO	2.600	2.000	ST	6	STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/COMMON TRANSFORMATION PROGRAM
2901	TS SPO	3.000	3.370	ST	6	B-1B WEAPON SYSTEM TRAINER (WST)
2968	TS SPO	1.510	1.000	ST	6	MODULAR SIMULATOR DESIGN
2998	TS SPO	1.240	0.000	ST	6	LOW ALTITUDE NAVIGATION AND TARGETING INFRARED SYSTEM FOR NIGHT (LANTIRN) SIMULATOR
3135	TS SPO	5.220	8.300	ET	6	ADVANCED TRAINING SYSTEM (ATS)
3282	TS SPO	24.300	8.100	ET	6	C-17 AIRCREW TRAINING SYSTEM (ATS)
3772	TS SPO	10.220	13.000	ET	6H	C-141 AIRCREW TRAINING SYSTEM (ATS)
3775	TS SPO	0.400	0.400	MP	2A	MANPOWER, PERSONNEL, AND TRAINING (MPT)
		58.187	41.221			TOTAL IN PE

(CONTINUED)

(CONTINUATION WITHIN PE 64243F)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
=====					
TOTAL FUNDING IN PROGRAM ELEMENT 64227F :			FY90	FY91	
			-----	-----	
THE PRESIDENT'S BUDGET, JANUARY 1990			58.186	41.220	
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(CONTINUED)

(CONTINUATION)

III-C-1: LISTING OF AIR FORCE PROJECTS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
64243F					MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT
3816	HSD	3.912	2.776 MP	2D	PILOT SELECTION AND CLASSIFICATION SYSTEM (PSACS)
3817	HSD	0.480	0.718 ET	6F	FORCEWIDE TRAINING SYSTEMS
		----- 4.393	----- 3.494		TOTAL IN PE

TOTAL FUNDING IN PROGRAM ELEMENT 64243F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	----- 4.392	----- 3.494



### III.D. DLA PROGRAM ELEMENT AND PROJECT SYNOPSES

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PE	TITLE	PAGE
64722S	JOINT SERVICE TRAINING SYSTEMS	III-D-1

Table III-C-1: Listing of Projects - Lists projects for each DLA program element. Lists contain performing organization, funding, Congressional Category and goal information.

III-D-i

PROGRAM ELEMENT OVERVIEW

PE: 64722S	JOINT SERVICE TRAINING SYSTEMS
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING
DoD ORGANIZATION:	DLA
FUNDING:	FY90 \$ 5.0M (FY91 PRESIDENT'S BUDGET) FY91 \$ 9.7M (FY91 PRESIDENT'S BUDGET)

PE SYNOPSIS:

The objective of this Program Element is to consolidate existing Program Elements to achieve more effective management of the joint-Service applications of new and emerging technologies to improve training and performance.

The joint-Service programs in this Program Element were established by the Secretary of Defense to improve training, performance and readiness of the Military Departments and Reserve Components. This Program Element expedites the prototype development of new training technologies and joint-Service training data systems that improve training effectiveness and enhance the performance of the military forces. It also saves DoD funds through the sharing of training and performance information as well as the transfer of emerging and innovative training technologies.

This Program Element is to transfer from DLA (64722S) to the Washington Headquarters Service (WHS) in FY91 as a result of the Defense Management Review (DMRD 932C) to achieve more effective management of these joint-Service Programs and provide more support and visibility to the training related programs which were recently endorsed by Congress.

The responsible agencies for these Projects are Force Management and Personnel and the Training and Performance Data Center.

RELATED ACTIVITIES:

Not applicable.

PAYOFF/UTILIZATION:

The payoff of this Program Element includes early identification of successful single-Service efforts that can be employed on a multi-Service/DoD-wide basis for improvement of military operations and training.

FUTURE DIRECTIONS:

Beyond FY91, efforts will continue in the sharing of training and performance information and the transfer of emerging and innovative training technologies.

## PROJECT OVERVIEW

		90	91
		----	----
PROJECT: 0001	JOINT SERVICE MANPOWER AND TRAINING SYSTEMS DEVELOPMENT	\$ 2.8M	\$ 5.4M
PE: 64722S	JOINT SERVICE TRAINING SYSTEMS		
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING		
DoD ORGANIZATION:	DLA		
RESPONSIBLE ORGANIZATION:	FORCE MANAGEMENT AND PERSONNEL		

-----  
PROJECT SYNOPSIS:

The objective of this Project is to rapidly prototype, test, and evaluate innovative training technologies with high payoff and increased effectiveness for multi-Service implementation and potential transition to private and public sectors.

In FY90, it is planned to: (a) develop a prototype system for aiding the training manager in deciding which instructional elements in training courses can be effectively transferred to the field in order to reduce resident/schoolhouse training and training costs, (b) complete the prototype development of a technique that automates the use of logistics support analysis data for training system design requirements. This technique shortens the instructional development cycle by using data already available for other applications, and (c) complete the development of a portable aid for training of explosive ordnance device personnel. This special purpose system will be operated in both classroom and field conditions depending on operational requirements to identify and render all varieties of munitions "safe".

In FY91, it is planned to: (a) develop and prototype a portable data collection, integration and communications device for evaluating the effectiveness of training exercises; this device will be used by training and operational personnel to capture, standardize and transfer individual and unit performance data to higher echelons for evaluation, (b) develop and prototype a system for internetting existing wargames and training simulations in order to increase training realism while drastically reducing training costs; this capability will foster a greater joint-Service capability for conducting Joint Task Force Exercises at theater and global levels, and (c) prototype and validate capability standards for the development of computer based and interactive video disk training courseware that allow their use on any training system.

## PAYOFF/UTILIZATION:

The payoff of this Project is rapid prototyping of technologies from the Services' R&D technology base, aligned with Service needs, which accelerates their demonstration and transition to use faster than is otherwise typical.

In FY89, specific accomplishments included: (a) development and validation of a large scale prototype system which processes and integrates Joint Exercise After Action Reports and provides lessons learned capabilities to the Service and JCS, (b) development and validation of a prototype system which integrates DoD individual and crew-served weapon systems characteristics, ranges and maneuver areas capabilities and locations, and unit training devices and simulators; this system enhances the use of existing training facilities and reduces training costs, and (c) prototyping and validation of an automated system for evaluating training alternatives and assessing their

relative effectiveness for weapon system acquisitions; this new capability will increase training effectiveness for new and updated weapon systems.

## PROJECT OVERVIEW

	90	91
	----	----
PROJECT: 0002	JOINT SERVICE TRAINING AND PERFORMANCE DATA SYSTEMS	\$ 2.2M \$ 4.3M
PE: 64722S	JOINT SERVICE TRAINING SYSTEMS	
CONGRESSIONAL CATEGORY:	EDUCATION & TRAINING	
DoD ORGANIZATION:	DLA	
RESPONSIBLE ORGANIZATION:	TRAINING PERFORMANCE DATA CENTER	

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PROJECT SYNOPSIS:

The objective of this Project is to develop multi-Service training and performance related tools, techniques, models, and data systems which support priority DoD needs.

This Project directly supports DoD training managers (OSD, Joint Staff, Unified Commands, and the Military Services) to promote more efficient and effective use of training resources, increase the effectiveness of military training and enhance the performance of the military forces. Products are developed in close coordination with end users to ensure transition to operational status upon completion of the RTD&E.

In FY90 it is planned to: (a) prototype an automated system to track and distribute Service training course data and information in a standardized format throughout DoD, (b) develop a system for identifying, evaluating applicability for training, and transferring training technology throughout the DoD. This interactive system will preclude unnecessary or inappropriate training technology RDT&E, and (c) develop an integrated system for the Reserve Components that will identify existing training and vocational education capabilities within DoD and the private sector to accomplish their unique education and training requirements.

In FY91 it is planned to: (a) prototype an architecture for extracting, integrating and sorting operability relevant performance measurement data. The output of this system will provide critical performance and effectiveness data to support Service user requirements, (b) prototype and validate a computerized system that links operational equipment, operator and maintenance occupations and the equipment specific training requirements, and (c) develop and prototype the capability to correlate operational equipment safety data with training activities and utilization of training devices.

## PAYOFF/UTILIZATION:

The payoff of this Project is to support Service requirements to improve performance measures and the effectiveness and efficiency of military training.

In FY89, specific accomplishments included: (a) development of an integrated data system which processes and identifies capabilities of ranges and training areas for each weapon system within DoD to promote more effective utilization of existing ranges depending on specific user needs, (b) prototyping an artificial intelligence based information processing capability to improve the tracking and reporting of lessons learned from training exercises in order to improve the effectiveness of future exercises, and (c) development of an interactive system to track and process data on technological applications for training equipment within DoD to avoid unnecessary duplication in the development of future training equipment.

### III-D-1: LISTING OF DLA PROJECTS

TOTAL FUNDING IN PROGRAM ELEMENT 64722S :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	5.000	9.689

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#### IV. OVERALL SYNOPSES AND PROJECT LISTINGS

#### IV.A. CONGRESSIONAL CATEGORY SYNOPSSES AND LISTINGS

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	CONGRESSIONAL CATEGORY	PAGE
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ARMY	Education and Training	IV-A-1
	Human Factors	IV-A-2
	Manpower and Personnel	IV-A-3
	Simulation and Training Devices	IV-A-4
NAVY	Education and Training	IV-A-5
	Human Factors	IV-A-6
	Manpower and Personnel	IV-A-7
	Simulation and Training Devices	IV-A-8
AIR FORCE	Education and Training	IV-A-9
	Human Factors	IV-A-10
	Manpower and Personnel	IV-A-11
	Simulation and Training Devices	IV-A-12
DLA	Education and Training	IV-A-13

Tables of project listings by Congressional Category follow each Congressional Category synopsis.



## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING  
DoD ORGANIZATION: ARMY  
CONTRIBUTING  
PROGRAM ELEMENTS: 61102A DEFENSE RESEARCH SCIENCES  
62785A MANPOWER, PERSONNEL, AND TRAINING  
TECHNOLOGY  
63007A HUMAN FACTORS, PERSONNEL AND  
TRAINING ADVANCED TECHNOLOGY

### SYNOPSIS:

This work focuses on developing and evaluating improved, cost-effective education and training applications for areas such as combat arms readiness and maintenance, and pilot and leadership training for the Active Army and the Reserve Component. Work will expand the applications of artificial intelligence, computers, and other electronic technology for training individual, crew/team, and unit collective skills.

The Army needs to provide job skills training and compensatory training for educationally disadvantaged personnel. Training literacy skills, are necessary to tailor training to maintain critical skills between Reserve Component training sessions. Specific job areas for attention include small arms training, navigation training, armor, aviation, supply maintenance, and logistics skill training.

Since the Army typically operates in units, it must know how people behave in organizations, how to evaluate group/unit performance and cohesion, and how to measure group improvement. Realistic battalion combat training is analyzed to determine the most effective methods for providing group performance feedback. Research will develop computer-based war games and simulators for company-level units to provide operationally realistic, inexpensive combined arms training.

Special attention is provided for combat service support training for battlefield maintenance tasks to assess and repair battle damage under difficult conditions, and to develop training programs for unconventional warfare.

At least three training products will be developed for use by more than one Service: (a) PEAM, a Portable Electronic Aid for Maintenance, (b) CHIP, the Computerized Hand-held Instructional Prototype, and (c) TRIADS, the Tri-Service Instructional Application Delivery System. Other efforts will establish a national manpower inventory to enable the Army to identify enlistee training needs more precisely.

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

61102A					DEFENSE RESEARCH SCIENCES
B74F-ET	ARI	0.680	0.646	3	PERSONNEL PERFORMANCE AND TRAINING

TOTAL: 0.681 0.647 (EDUCATION AND TRAINING IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	6.602	6.300

(CONTINUED)

(CONTINUATION)

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A791-ET	ARI	3.235	3.221	6		MANPOWER, PERSONNEL AND TRAINING
	TOTAL:	3.235	3.221			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 62785A :						
					FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990					16.974	17.122

(CONTINUED)

(CONTINUATION)

IV-A-1 : LISTING OF ARMY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
-----						
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A794	ARI	4.146	3.800	6		EDUCATION AND TRAINING
	TOTAL:	4.147	3.800	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
						FY90
						FY91
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						18.896
						18.737
-----						

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS  
DoD ORGANIZATION: ARMY  
CONTRIBUTING  
PROGRAM ELEMENTS: 61102A DEFENSE RESEARCH SCIENCES  
62716A HUMAN FACTORS ENGINEERING  
TECHNOLOGY  
62785A MANPOWER, PERSONNEL, AND TRAINING  
TECHNOLOGY  
63007A HUMAN FACTORS, PERSONNEL AND  
TRAINING ADVANCED TECHNOLOGY

### SYNOPSIS:

A principal objective of Army work in Human Factors is to ensure the operability, maintainability, sustainability, and survivability of systems in various stages of development and deployment. These systems can increase potential battlefield effectiveness, but they are often sophisticated and require complex skills, heavy operator workload, quick reactions, and confident and accurate decisions to operate and maintain.

Engineering options must be considered during the entire developmental cycle to balance the demands with projected availability of personnel who have appropriate skills. Some human operator competencies can be enhanced by task allocation methods or by system design. A major objective is to develop and evaluate methods to identify human factors, manpower, personnel, and training (HMPT) requirements early in system design. This includes methods to integrate new equipment into units in the field and embedding training in the design of new systems.

Research will use soldier performance data to: (a) develop better engineering design principles, (b) learn about the capabilities and limitations of men and women to improve performance predictions with equipment in field conditions, (c) apply the data throughout the Army materiel development process, (d) provide design guidance for all types of equipment that is worn, operated, or maintained by soldiers, and (e) determine which tasks are best performed by humans, which are best performed by robots and other hardware, and how to combine these components.

The Human Factors area investigates soldier-computer interfaces in systems such as C3I (Command, Control, Communications and Intelligence) systems. Other efforts in this area will exploit technology to support logistics systems analysis, ammunition supply systems, robotics, computer automation, and artificial intelligence as they relate to increased productivity.

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
61102A						DEFENSE RESEARCH SCIENCES
B74A	HEL	3.024	2.897		4	HUMAN ENGINEERING
B74F-HF	ARI	1.002	0.953		4	PERSONNEL PERFORMANCE AND TRAINING
	TOTAL:	4.027	3.851			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	6.602	6.300

(CONTINUED)

(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62716A						HUMAN FACTORS ENGINEERING TECHNOLOGY
AH70	HEL	15.000	15.323	4		HUMAN FACTORS ENGINEERING SYSTEM DEVELOPMENT
TOTAL:		15.000	15.323	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62716A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	15.000	15.323

(CONTINUED)

(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-HF	ARI	1.935	1.981	4		HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-HF	ARI	3.302	3.315	6		MANPOWER, PERSONNEL AND TRAINING
TOTAL:		5.238	5.297			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	16.974	17.122

(CONTINUED)



(CONTINUATION)

IV-A-2 : LISTING OF ARMY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A793	ARI	5.138	5.819	4		HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
A796	HEL	0.700	0.750	4		HUMAN FACTORS ENGINEERING IN SYSTEMS DESIGN
	TOTAL:	5.839	6.570			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63007A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	18.896	18.737

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY:     MANPOWER & PERSONNEL  
DoD ORGANIZATION:           ARMY  
CONTRIBUTING  
PROGRAM ELEMENTS:           61102A DEFENSE RESEARCH SCIENCES  
                              62785A MANPOWER, PERSONNEL, AND TRAINING  
  TECHNOLOGY  
                              63007A HUMAN FACTORS, PERSONNEL AND  
  TRAINING ADVANCED TECHNOLOGY

### SYNOPSIS:

The Army and the other Services will continue to share a dwindling supply of young adults while meeting demands for high technology skills to operate and maintain many complex weapon systems. The Army must effectively recruit, select, assign, utilize, and retain adequate numbers, and is pursuing a strategy that can ensure that the most advanced tools for doing so are in the leaders' hands.

This research provides a scientific basis for the later development of: (a) improved, computer-based selection and assignment tests, especially procedures to link soldier selection to job performance, (b) methods to examine new variables such as pre-service experiences, (c) methods to assign recruits to jobs that capitalize on their aptitudes and vocational interests, (d) programs to develop cohesive units and leaders needed to assure combat readiness, (e) methods to increase satisfaction and identification with, and commitment to, Army life, (f) methods to research the effects of the family on soldier retention, (g) methods to increase enlistment and reenlistment rates and reduce attrition rates of highly qualified soldiers, (h) techniques to examine and improve Army civilian personnel performance and management, and (i) methods to determine aggregated future manpower requirements in view of new systems and force structures in the battlefield of the future.

Basic research work will investigate how decision-makers function in computer-driven, high-stress, problem-solving situations. Efforts will help develop computerized aids for problem-solving, planning, and decision-making to overcome these situational difficulties.

Some recent accomplishments include research on what motivates enlistment, and how the leader and the unit environment affect individual soldier performance. New methods were developed for predicting job performance, and a database was established for tracking men and women who enlisted and did not enlist, and their reasons for doing so. Work continues on systems such as HARDMAN (hardware vs. manpower) and MIST (Man Integrated Systems Technology) to help predict or determine manpower, personnel, and training requirements of developing systems and to correlate these needs with available resources.

IV-A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

61102A					DEFENSE RESEARCH SCIENCES
B74F-MP	ARI	0.787	0.749	4B	PERSONNEL PERFORMANCE AND TRAINING

TOTAL: 0.788 0.750 (MANPOWER AND PERSONNEL IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	6.602	6.300

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(CONTINUATION)

IV-A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A791-MP	ARI	4.170	4.133	2		MANPOWER, PERSONNEL AND TRAINING
TOTAL:		4.171	4.134	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	16.974	17.122

(CONTINUED)

(CONTINUATION)

IV-A-3 : LISTING OF ARMY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
63C07A					HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A792	ARI	6.301	5.798	2	MANPOWER AND PERSONNEL
	TOTAL:	6.302	5.799		(MANPOWER AND PERSONNEL IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :					
					FY90
THE PRESIDENT'S BUDGET, JANUARY 1990					18.896
					FY91
					18.737

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: ARMY  
CONTRIBUTING  
PROGRAM ELEMENTS: 61102A DEFENSE RESEARCH SCIENCES  
62727A NON-SYSTEM TRAINING DEVICES  
(NSTD) TECHNOLOGY  
62785A MANPOWER, PERSONNEL, AND TRAINING  
TECHNOLOGY  
63003A AVIATION ADVANCED TECHNOLOGY  
63007A HUMAN FACTORS, PERSONNEL AND  
TRAINING ADVANCED TECHNOLOGY  
64715A NON-SYSTEM TRAINING DEVICES -  
ENGINEERING DEVELOPMENT  
64801A AVIATION ENGINEERING DEVELOPMENT

### SYNOPSIS:

The objective for the Armys research on simulation and training devices is combat readiness. Work focuses on high-fidelity devices which simulate realistic combat scenarios, yet remain relatively low in cost and lower in complexity than previous simulators.

A major requirement is to develop devices that apply new techniques and technologies in artificial intelligence, computer-aided instruction, and robotic computers to accelerate learning, increase attention and increase mental and physical peak performance to sustain troops in combat. Army embedded training and combined arms training efforts will also be advanced.

Work continues on developing techniques such as videodisks and laser-based weapon simulation for improved war game battle simulations, and for the development of technology for multi-purpose training devices.

The aim of simulation development is to improve pilot training and safety while reducing costs and supporting helicopter engineering development. Basic research includes investigating the nature of knowledge representation and transfer, the effects of expertise in complex task domains, and the major objective is to continue research developing improved training systems such as: (a) low-cost flight simulators, (b) armor and anti-armor, artillery and infantry training, (c) training devices that tie together battlefield weapon systems, mobility, and command, control, communications, and intelligence, and (d) systems that provide full mission training capability in a combat environment. These training systems will provide effective, low-cost tactical training for both Active Army and Reserve Components, for both maintenance and combat service support personnel.

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61102A						DEFENSE RESEARCH SCIENCES
874F-ST	ARI	1.109	1.055		6	PERSONNEL PERFORMANCE AND TRAINING
	TOTAL:	1.109	1.055			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61102A :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	6.602	6.300

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62727A						NON-SYSTEM TRAINING DEVICES (NSTD) TECHNOLOGY
A230	PMTRADE	4.408	4.518	6		NON-SYSTEM TRAINING DEVICES
	TOTAL:	4.409	4.519			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62727A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	4.408	4.518

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62785A						MANPOWER, PERSONNEL, AND TRAINING TECHNOLOGY
A790-ST	ARI	2.230	2.297	6		HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION
A791-ST	ARI	2.102	2.175	6		MANPOWER, PERSONNEL AND TRAINING
	TOTAL:	4.333	4.473			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62785A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	16.974	17.122

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
63003A					AVIATION ADVANCED TECHNOLOGY
DB34	AVSCOM	3.094	3.005	6	ROTORCRAFT SYSTEM INTEGRATION SIMULATOR (RSIS)
DB39	PMTRADE	0.854	0.866	6	FLIGHT SIMULATOR COMPONENTS
	TOTAL:	3.949	3.872		(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63003A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	3.948	3.871

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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
63007A						HUMAN FACTORS, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY
A795	ARI	2.115	2.822	6		TRAINING SIMULATION
	TOTAL:	2.115	2.822	(SIMULATION AND TRAINING DEVICES IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63007A :						
					FY90	FY91
					-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990					18.896	18.737
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(CONTINUATION)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715A						NON-SYSTEM TRAINING DEVICES - ENGINEERING DEVELOPMENT
D241	PMTRADE	7.790	21.418	6		NON-SYSTEM TRAINING DEVICES COMBINED ARMS
D573	PMTRADE	8.334	8.934	6B		PROJECT MANAGER FOR TRAINING DEVICES AND NAVAL TRAINING SYSTEMS CENTER SUPPORT
D574	PMTRADE	0.000	11.500	6F		COMBINED ARMS TACTICAL TRAINER
TOTAL:		16.125	41.853	(SIMULATION AND TRAINING DEVICES IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 64715A :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	16.124	41.852

(CONTINUED)

IV-A-4 : LISTING OF ARMY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
<hr/>						
64801A						AVIATION ENGINEERING DEVELOPMENT
D275	PMTRADE	4.576	3.927		6D	SYNTHETIC FLIGHT TRAINING SYSTEMS
DE70	PMTRADE	6.039	10.333		6D	AVIATION NON-SYSTEM TRAINING DEVICES
TOTAL:		----- 10.616	----- 14.260	(SIMULATION AND TRAINING DEVICES IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 64801A :						
						FY90 -----
						FY91 -----
THE PRESIDENT'S BUDGET, JANUARY 1990						10.615      14.260

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING  
DoD ORGANIZATION: NAVY  
CONTRIBUTING  
PROGRAM ELEMENTS: 61153N DEFENSE RESEARCH SCIENCES,  
SUBELEMENT 42: COGNITIVE AND  
NEURAL SCIENCES  
62233N MISSION SUPPORT TECHNOLOGY:  
PERSONNEL, TRAINING AND  
SIMULATION TECHNOLOGY AREA  
63720N EDUCATION AND TRAINING

### SYNOPSIS:

The objective of the Navy effort in Education and Training is to support effective training of military personnel through advancement of training technology, development of training standards, and improvement of procedures for matching training to job requirements.

The major areas of activity for this effort include the systems, cognitive processes, automated instruction in formal schools, basic skills enhancement, individual and group performance measurement, individual and team training, Naval Reserve training, on-the-job training, weapon system operator/maintainer training, training materials development, resource management, Enlisted Personnel Individualized Career System (EPICS), leadership criteria development, recruit/post-recruit training personnel attrition, enhancement of generic problem-solving ability among Naval Officers, and development of training standards for collective tasks performed by combat service support groups.

The benefits of this effort include the following: (a) solution of many training problems in the Navy through the introduction of more individualized, automated, and simulator-based instruction, better training standards for all unit levels, and improved less manpower-intensive procedures for matching training to job requirements, (b) deferred and reduced shore-based training for first-term enlistees, with on-job effectiveness maintained through EPICS, (c) reduced costs of preparing instructional materials for critical programs through use of authoring instructional materials, (d) more lower-cost practice of critical skills through advanced computer-aided instruction, (e) reduced training time, improved student motivation, and increased ability to perform critical tasks through functional context training, (f) improved decision-making about the use of computer-based training technology, (g) reduced scheduling inefficiencies and improved training outcomes through training resource management, and (h) improved performance in multi-ship, multi-threat warfare through team training instructional system development.

IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61153N						DEFENSE RESEARCH SCIENCES, SUBELEMENT 42: COGNITIVE AND NEURAL SCIENCES
RR04206	ONR	6.890	7.426		6	PERSONNEL AND TRAINING
	TOTAL:	6.891	7.427			(EDUCATION AND TRAINING IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61153N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	12.527	13.501

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(CONTINUATION)

IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RM33D40	NTSC	0.816	1.871	6A		TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)
RM33T23	NPRDC	1.348	1.373	6		TRAINING SYSTEMS TECHNOLOGY
	TOTAL:	2.164	3.245			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 62233N :						
						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						8.333
						-----
						FY91
						-----
						10.375
						-----

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IV-A-5 : LISTING OF NAVY IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
-----						
63720N						EDUCATION AND TRAINING
R1772	NPRDC	5.222	5.983	6		EDUCATION AND TRAINING
	TOTAL:	5.223	5.984	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63720N :						
					FY90	FY91
					-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990					5.222	5.983
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## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS

DoD ORGANIZATION: NAVY

CONTRIBUTING  
PROGRAM ELEMENTS: 61153N DEFENSE RESEARCH SCIENCES,  
SUBELEMENT 42: COGNITIVE AND  
NEURAL SCIENCES

62233N MISSION SUPPORT TECHNOLOGY:  
PERSONNEL, TRAINING AND  
SIMULATION TECHNOLOGY AREA

62234N SYSTEMS SUPPORT TECHNOLOGY: HUMAN  
FACTORS TECHNOLOGY AREA

63701N HUMAN FACTORS ENGINEERING  
DEVELOPMENT

### SYNOPSIS:

The objectives of the Navy effort in Human Factors are to: (a) develop enhanced group decision-making procedures through research in decision making, perception, and human-computer interaction, (b) develop technology to manage and present information for rapid and accurate assimilation, (c) develop a systems-oriented human performance database, the methods to define human functional capabilities, and the interface requirements in the context of aviation systems and missions, (d) provide Navy systems developers with the resources and expertise to implement advanced concepts, (e) improve combat effectiveness and survivability through applications of man-machine integration methods in the design and updating of airborne systems, (f) design, develop, test, and evaluate new process control techniques for improving the quality and productivity of the repair and overhaul of Navy ships and aircraft, (g) improve the process of identifying, applying, and evaluating new technology in Navy shore support activities, and (h) develop and utilize more human factors engineering (HFE) techniques to help solve man-machine interface problems.

Developmental efforts include: (a) systematic knowledge/technology bases and appropriate assessment methods for matching performance capabilities to system requirements, (b) adaptive interactive displays, expert systems, and computer-based aids for enhanced decision making, (c) improved systems design in combat/engineering systems, shipboard administration and logistical data processing, and electronic maintenance and troubleshooting, (d) quality control and productivity in the repair and overhaul of ships and aircraft, and (e) identification and application of state-of-the-art technology to critical repair, maintenance, and acquisition problems in support functions.

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

61153N DEFENSE RESEARCH SCIENCES,  
SUBELEMENT 42: COGNITIVE  
AND NEURAL SCIENCES

TOTAL FUNDING IN PROGRAM ELEMENT 61153N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	12.527	13.501

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(CONTINUATION)

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RM33D60	NOSC	0.817	1.871	4B		TACTICAL DECISION-MAKING UNDER STRESS (TADMUS)
TOTAL:		0.818	1.872	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	8.333	10.375

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(CONTINUATION)

IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE, PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
62234N						SYSTEMS SUPPORT TECHNOLOGY: HUMAN FACTORS TECHNOLOGY AREA
RS34H20	NOSC	3.739	3.622	4		HUMAN FACTORS TECHNOLOGY
RS34H21	NPRDC	0.650	0.600	5A		BIOPSYCHOMETRIC ASSESSMENT
	TOTAL:	4.390	4.223	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62234N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	4.389	4.222

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IV-A-6 : LISTING OF NAVY IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63701N						HUMAN FACTORS ENGINEERING DEVELOPMENT
R1771	NOSC	1.617	1.881	4		SHIP HUMAN FACTORS ENGINEERING DEVELOPMENT
W0542	NADC	0.855	1.002	4		AIR HUMAN FACTORS ENGINEERING
	TOTAL:	2.473	2.884			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63701N :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	2.472	2.883

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: MANPOWER & PERSONNEL

DoD ORGANIZATION: NAVY

CONTRIBUTING  
PROGRAM ELEMENTS:

- 61153N DEFENSE RESEARCH SCIENCES,  
SUBELEMENT 42: COGNITIVE AND  
NEURAL SCIENCES
- 62131M MARINE CORPS LANDING FORCE  
TECHNOLOGY
- 62233N MISSION SUPPORT TECHNOLOGY:  
PERSONNEL, TRAINING AND  
SIMULATION TECHNOLOGY AREA
- 63707N MANPOWER AND PERSONNEL SYSTEMS
- 63732M ADVANCED MANPOWER/TRAINING SYSTEMS
- 64703N PERSONNEL, TRAINING, SIMULATION,  
AND HUMAN FACTORS

### SYNOPSIS:

The objectives of the Navy effort in Manpower and Personnel are to: (a) increase understanding of the psychological and organizational variables that determine the performance of individuals, groups, teams, and units, (b) develop and evaluate systems to improve manpower requirements determination and personnel utilization, and (c) develop managerial and statistical concepts and techniques that will lead to more cost-effective personnel management.

The major areas of activity for this effort include development of: (a) theories and models of small, task-oriented team performance, (b) a computerized adaptive testing (CAT) system to replace the Armed Services Vocational Aptitude Battery (ASVAB) for selection and classification, (c) a neuro-electric and neuro-magnetic recording capability as part of the biopsychometric measurement project, (d) user-friendly techniques to summarize and synthesize data to enhance manpower decision making and improve force management capabilities at reduced data management costs, (e) a methodology for developing reliable, valid, and useable job proficiency testing for Marine Corps enlisted personnel, (f) methods for improving the Navy selection/assignment process, recruiting techniques, retention of high-quality personnel, and personnel motivation and productivity, (g) enlistment selection criteria which is related to successful job performance, and (h) technology to increase training efficiency and effectiveness, and to improve training software transportability.

The benefit of the Navy efforts in this area will be improved personnel utilization and increased readiness through increased ability to respond to a wide variety of manpower/personnel issues.

IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

61153N DEFENSE RESEARCH SCIENCES,  
SUBELEMENT 42: COGNITIVE  
AND NEURAL SCIENCES

TOTAL FUNDING IN PROGRAM ELEMENT 61153N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	12.527	13.501

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62131M						MARINE CORPS LANDING FORCE TECHNOLOGY
CF31P14	NPRDC	0.525	0.550	2		MARINE CORPS MANPOWER & TRAINING TECHNOLOGY
TOTAL:		0.525	0.551	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62131M :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	0.525	0.550

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(CONTINUATION)

IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
62233N						MISSION SUPPORT TECHNOLOGY: PERSONNEL, TRAINING AND SIMULATION
RM33M20	NPRDC	2.888	2.930	2		MANPOWER AND PERSONNEL TECHNOLOGY
TOTAL:		2.888	2.931	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	8.333	10.375

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
63707N						MANPOWER AND PERSONNEL SYSTEMS
R1770	NPRDC	3.029	3.200	2		MANPOWER AND PERSONNEL SYSTEMS
	TOTAL:	3.030	3.201	(MANPOWER AND PERSONNEL IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63707N :						
						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						3.029
						-----
						FY91
						-----
						3.200
						-----

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
=====						
63732M						ADVANCED MANPOWER/TRAINING SYSTEMS
C0073	NPRDC	3.969	3.110	1A		HUMAN RESOURCES MANAGEMENT AND FORECASTING
	TOTAL:	-----	-----			
		3.970	3.110	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63732M :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	-----	-----
	3.969	3.110

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IV-A-7 : LISTING OF NAVY IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64703N						PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
R1822	NPRDC	0.994	1.069	2		PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS
TOTAL:		0.995	1.069	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 64703N :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	0.994	1.069

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES

DoD ORGANIZATION: NAVY

CONTRIBUTING  
PROGRAM ELEMENTS: 62233N MISSION SUPPORT TECHNOLOGY:  
PERSONNEL, TRAINING AND  
SIMULATION TECHNOLOGY AREA

63733N SIMULATION AND TRAINING DEVICE  
TECHNOLOGY

64715N SURFACE WARFARE TRAINING

### SYNOPSIS:

The objectives of the Navy effort in Simulation and Training Devices are to: (a) develop technology to improve the training effectiveness of existing Navy simulators and training devices, and to lower their costs, (b) develop new trainers for weapon system training, flight training, and maintenance training, (c) upgrade the operational capability of Navy ASW aircraft with improved acoustic and non-acoustic sensors, (d) develop a training system for specialized ships, (e) develop a generic training system to replace obsolete/obsolescent devices for team tactical training, and (f) conduct front-end analysis of specific training problems by defining requirements/shortfalls, training objectives, and student loading, and identifying alternate solutions with related cost/training effectiveness trade-offs.

Developmental efforts include: (a) a prototype automated system to facilitate transfer of knowledge from a subject matter expert to an intelligent training system, (b) visual and sensor simulation for AI-based trainer designs, (c) realistic battle group-level training for senior Naval officers and their staffs, (d) a training device to provide individual and team training, (e) a training system to provide training in equipment operation, data acquisition/interpretation, and utilization in tactical combat exercises, (f) two trainers to meet the increasing need to train AIC and ASAC personnel, (g) a trainer for dynamic team training in skills essential to qualify enlisted ratings assigned to Combat Information Centers (CICs), (h) a modification of the TACDEW system to provide more modern radar capabilities, and incorporate a state-of-the-art problem control and evaluation subsystem, (i) training devices to replace the obsolete devices currently used to provide ASW team training, (j) operator/team trainers in electronic/acoustic surveillance in ASW operations, maintenance trainers for various electronic/acoustic devices and trainers, and other stimulation/simulation training device techniques, and (k) training requirements, through the HARDMAN study, for the Surface Warfare Community, and individually tailored, detailed trainer/training systems selection procedures.

IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

TOTAL FUNDING IN PROGRAM ELEMENT 62233N :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	8.333	10.375

(CONTINUED)

(CONTINUATION)

IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63733N						SIMULATION AND TRAINING DEVICE TECHNOLOGY
W1773	NTSC	0.973	5.042	6		SIMULATION AND TRAINING DEVICES
TOTAL:		0.974	5.043	(SIMULATION AND TRAINING DEVICES IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 63733N :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	0.973	5.042

(CONTINUED)



(CONTINUATION)

IV-A-8 : LISTING OF NAVY IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64715N						SURFACE WARFARE TRAINING
S1140	NTSC	0.972	0.000	6		TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATION
S1427	NTSC	7.197	11.025	6		SURFACE TACTICAL TEAM TRAINER
S1834	NTSC	9.044	1.332	6		LANDING CRAFT AIR CUSHION (LCAC) OPERATOR TRAINER
	TOTAL:	17.213	12.357			(SIMULATION AND TRAINING DEVICES IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64715N :

	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	17.213	12.357

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING

DoD ORGANIZATION: AIR FORCE

CONTRIBUTING  
PROGRAM ELEMENTS: 62205F PERSONNEL, TRAINING, AND  
SIMULATION

63227F PERSONNEL, TRAINING, AND  
SIMULATION TECHNOLOGY

64227F FLIGHT SIMULATOR DEVELOPMENT

64243F MANPOWER, PERSONNEL, AND TRAINING  
DEVELOPMENT

### SYNOPSIS:

The objectives within this area include the: (a) development of flight simulator hardware which will improve training and reduce training costs, (b) design and development of better simulators for maintenance training to eliminate the need for expensive operational equipment, (c) design and development of computer-based instructional technologies for technical and flight training, (d) development of improved courseware, training delivery options, training aids, and related products, (e) development of technology and programs to train, assess and aid command and control operators, especially in combat-related activities, and (f) development of new training technologies and logistics support methods which are expected to increase the productivity of Air Force personnel, improve the cost-effectiveness of technical and flight training, and result in enhanced operational readiness.

Recently completed accomplishments include: (a) development and testing of Air Force officer and enlisted specialty performance measurement technology, (b) initiating validation of the high school version of the Armed Services Vocational Aptitude Battery (ASVAB), (c) completion of the improved user-friendly Comprehensive Occupational Data Analysis Program (CODAP) software system, (d) development of instructional modules for identified job prerequisites, (e) development of specifications for evaluation of training effectiveness, and (f) development of initial specifications for the advanced Training Decision System (TDS).

Future efforts will continue to focus on the design, development and evaluation of new technologies for training personnel in technical areas such as maintenance, command and control, and flight training. Software and hardware developments in the areas of training, training management and aircraft logistics support will be pursued to provide enhanced training capabilities, improved C2 and C3 systems, and resulting benefits to overall personnel utilization and productivity.

IV-A-9 : LISTING OF AF IN EDUCATION AND TRAINING

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	28.169	30.508

(CONTINUED)

(CONTINUATION)

IV-A-9 : LISTING OF AF IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2949	AFHRL	2.375	2.386	6		TRAINING SYSTEMS DEVELOPMENT
	TOTAL:	2.375	2.387			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :						
THE PRESIDENT'S BUDGET. JANUARY 1990						

(CONTINUED)

(CONTINUATION)

IV-A-9 : LISTING OF AF IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
3135	TS SPO	5.220	8.300	6		ADVANCED TRAINING SYSTEM (ATS)
3282	TS SPO	24.300	8.100	6		C-17 AIRCREW TRAINING SYSTEM (ATS)
3772	TS SPO	10.220	13.000	6H		C-141 AIRCREW TRAINING SYSTEM (ATS)
	TOTAL:	39.740	29.401			(EDUCATION AND TRAINING IN PE)
TOTAL FUNDING IN PROGRAM ELEMENT 64227F :						
					FY90	FY91
					58.186	41.220

(CONTINUED)

(CONTINUATION)

IV-A-9 : LISTING OF AF IN EDUCATION AND TRAINING

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
-----						
64243F						MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT
3817	HSD	0.480	0.718	6F		FORCEWIDE TRAINING SYSTEMS
	TOTAL:	0.481	0.719	(EDUCATION AND TRAINING IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 64243F :						
						FY90
						-----
THE PRESIDENT'S BUDGET, JANUARY 1990						4.392
						-----
						FY91
						-----
						3.494
						-----

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: HUMAN FACTORS  
DoD ORGANIZATION: AIR FORCE  
CONTRIBUTING  
PROGRAM ELEMENTS: 61102F DEFENSE RESEARCH SCIENCES  
62202F HUMAN SYSTEMS TECHNOLOGY  
62205F PERSONNEL, TRAINING, AND  
SIMULATION  
63106F LOGISTICS SYSTEMS TECHNOLOGY  
63231F CREW SYSTEMS AND PERSONNEL  
PROTECTION TECHNOLOGY  
64243F MANPOWER, PERSONNEL, AND TRAINING  
DEVELOPMENT

### SYNOPSIS:

The overall goal of the Air Force efforts in Human Factors is support of the planning, design and procurement of new aerospace systems. The main criteria for systems design are operability and maintainability, with concern also focused on survivability in hostile combat environments.

Systems can be designed to be compatible with human capabilities and limitations. Objectives are to: (a) improve selection of personnel for appropriate jobs on the basis of measured mental abilities and sensory-motor skills, (b) design equipment to optimally match human workload and performance, (c) improve human performance in weapon systems and operations by refining crew selection, (d) establish threat characterization and integration into military space systems, (f) provide advanced development and demonstration of concepts to extend the performance of the crewman in the aerospace environment, (g) respond to the requirements of optimally integrating man into future military space systems, and (h) develop better training technologies to increase efficiency and productivity of Air Force personnel.

Efforts will continue in the areas of: (a) visual information processing, (b) development of new workload metrics, (c) performance prediction based on systematic investigation of parameters of learning ability, (d) development of dynamic models to predict operator stress limits and performance effectiveness, (e) development of design criteria and mission planning guides to reduce operator overload and optimize man-machine integration, (f) design and development of integrated display/control systems for airborne and aerospace missions, (g) development of needed tools and methodologies to extend air/aerospace (h) development of human factors performance definitions and design criteria applicable to demonstration of military crew stations for advanced aerospace systems, and (i) pursue improvements and cost savings in training and management of personnel i.e., simulation technology and computer technology.

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
61102F						DEFENSE RESEARCH SCIENCES
2313	AFOSR	8.761	9.289		4	HUMAN RESOURCES
	TOTAL:	8.761	9.289			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 61102F :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	8.761	9.289

(CONTINUED)



(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
62202F					HUMAN SYSTEMS TECHNOLOGY
06MD	HSD	4.328	4.456	4	HUMAN SYSTEMS DIVISION LABORATORY OPERATIONS
6893	HSD	1.200	1.243	4	MANNED WEAPON SYSTEMS EFFECTIVENESS
7184	HSD	6.450	6.306	4	MAN-MACHINE INTEGRATION TECHNOLOGY
TOTAL:		11.979	12.005	(HUMAN FACTORS IN PE)	

TOTAL FUNDING IN PROGRAM ELEMENT 62202F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	11.978	12.005

(CONTINUED)

(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-HF	AFHRL	2.700	3.100	V A R		LABORATORY SUPPORT
1710	AFHRL	2.822	2.950	4		LOGISTICS AND MAINTENANCE TECHNOLOGY
TOTAL:		5.523	6.051	(HUMAN FACTORS IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	28.169	30.508

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(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63106F						LOGISTICS SYSTEMS TECHNOLOGY
2745	AFHRL	0.075	0.100	4A		LOGISTICS FOR COMBAT READINESS MAINTENANCE
2940	AFHRL	3.429	4.528	4D		COMPUTER TECHNOLOGY FOR SYSTEMS DESIGN AND MAINTENANCE
2950	AFHRL	5.610	7.130	4D		INTEGRATED MAINTENANCE INFORMATION SYSTEM (IMIS)
	TOTAL:	9.115	11.759			(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63106F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	9.114	11.758

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(CONTINUATION)

IV-A-10 : LISTING OF AF IN HUMAN FACTORS

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
63231F					CREW SYSTEMS AND PERSONNEL PROTECTION TECHNOLOGY
2829	AMD	4.926	4.100	4	COCKPIT AUTOMATION TECHNOLOGY (CAT)
2992	AMD	0.685	1.200	4	SPACE CREW ENHANCEMENT (SPACE)
TOTAL:		5.612	5.301		(HUMAN FACTORS IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63231F :

	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	5.611	5.300

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY:     MANPOWER & PERSONNEL  
DoD ORGANIZATION:         AIR FORCE  
CONTRIBUTING  
PROGRAM ELEMENTS:         62205F PERSONNEL, TRAINING, AND  
                               SIMULATION  
                               63227F PERSONNEL, TRAINING, AND  
                                       SIMULATION TECHNOLOGY  
                               64243F MANPOWER, PERSONNEL, AND TRAINING  
                                       DEVELOPMENT

### SYNOPSIS:

The objective of work in the Manpower and Personnel area is to incorporate two interrelated streams of research designed to address the problems involved in acquiring and maintaining a quality force by developing the technology to enhance selection, assignment, training and retention of that force.

The Air Force efforts require a continuing supply of high-quality personnel who can operate and maintain sophisticated weapon and support systems. To this end, research efforts intend to: (a) develop and validate personnel testing procedures, (b) determine and measure specific requirements for Air Force jobs, (c) improve the process for matching individuals to jobs, (d) develop models and strategies to improve retention, (e) develop comprehensive skills management and reenlistment/career assignment programs, (f) measure and evaluate job performance and link enlistment standards to on-the-job performance, and (g) automate procedures to address fundamental training management issues.

Recent accomplishments include: (a) an integrated pilot selection system using perceptual and psychomotor measures, (b) completion of development of ninth and tenth grade norms for the Armed Services Vocational Aptitude Battery (ASVAB), (c) implementation of a new edition of the Air Force Officer Qualifying Test (AFOQT) and of a field-tested officer training school selection system, (d) completion of a model to select candidates for medical school scholarships and a database tracking system to provide long-term validity of the selection policy, and (e) completion of a model to determine both pre- and post-enlistment factors influencing career interests and actual separation or retention behavior.

Research efforts will continue to: (a) revise the AFOQT and subsets of the ASVAB, (b) develop, demonstrate and evaluate computer systems for use in selection and classification, (c) detail assessment of job specifications and skill requirements, (d) evaluate a variety of personnel assignment algorithms, and (e) improve and implement training decision systems.

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
62205F						PERSONNEL, TRAINING, AND SIMULATION
06HT-MP	AFHRL	3.600	3.900		V A R	LABORATORY SUPPORT
7719	AFHRL	2.556	2.741		2	FORCE ACQUISITION AND DISTRIBUTION SYSTEM
	TOTAL:	6.157	6.642			(MANPOWER AND PERSONNEL IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	28.169	30.508

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(CONTINUATION)

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
63227F					PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2922	AFHRL	1.054	1.382	2	MANPOWER AND FORCE MANAGEMENT
	TOTAL:	1.054	1.383		(MANPOWER AND PERSONNEL IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 63227F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	7.420	8.198

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(CONTINUATION)

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M) CAT	GOAL	PE/PROJECT TITLES
64227F					FLIGHT SIMULATOR DEVELOPMENT
3775	TS SPO	0.400	0.400	2A	MANPOWER, PERSONNEL, AND TRAINING (MPT)
	TOTAL:	0.400	0.400	(MANPOWER AND PERSONNEL IN PE)	
TOTAL FUNDING IN PROGRAM ELEMENT 64227F :					
	THE PRESIDENT'S BUDGET, JANUARY 1990				

(CONTINUED)



(CONTINUATION)

IV-A-11 : LISTING OF AF IN MANPOWER AND PERSONNEL

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64243F						MANPOWER, PERSONNEL, AND TRAINING DEVELOPMENT
3816	HSD	3.912	2.776	2D		PILOT SELECTION AND CLASSIFICATION SYSTEM (PSACS)
TOTAL:		3.912	2.776	(MANPOWER AND PERSONNEL IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 64243F :	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	4.392	3.494

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: SIMULATION & TRAINING DEVICES  
DoD ORGANIZATION: AIR FORCE  
CONTRIBUTING  
PROGRAM ELEMENTS: 62205F PERSONNEL, TRAINING, AND  
SIMULATION  
63227F PERSONNEL, TRAINING, AND  
SIMULATION TECHNOLOGY  
64227F FLIGHT SIMULATOR DEVELOPMENT

### SYNOPSIS:

The main objective in the Simulation and Training Devices area is the continuing development of aircrew flight simulator techniques and training devices. This work explores technologies such as computer image generation, holography, digital imaging, radar simulation, embedded training concepts, and infrared systems. Some visual simulation objectives include better image definition, color representation, and image dynamics, development of full field-of-view displays, and the accurate representation of special sensors.

While much of the focus is on pilot and navigator training, particularly in training and retraining of combat skills, attention is also being given to command and control and maintenance functions. Research efforts intend to: (a) upgrade trainers and simulators to provide greater realism and to improve the concurrency between changing aircraft features and flight simulators, (b) reduce life-cycle costs, (c) integrate a variety of hardware and software systems, (d) improve the instructional features of equipment, (e) develop multi-task as well as part-task trainers, (f) develop computer-based systems for authoring of training, information presentation, drill and practice, testing and evaluation, and training management, (g) develop databases, including transportable databases, for simulation programs, (h) develop continuation training and mission/upgrade training, (i) develop integrated crew training, (j) develop simulated video, environmental effects and gaming scenarios, and (k) simulate day, night, under-the-weather conditions for training pilots and navigators.

Recent achievements within this category include the development of an operational flight trainer which provides a training environment for the EF-111 mission, including the capability of simulating the central European radar environment and all aircraft flight profiles.

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

TOTAL FUNDING IN PROGRAM ELEMENT 62205F :	FY90	FY91
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THE PRESIDENT'S BUDGET, JANUARY 1990	28.169	30.508

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(CONTINUATION)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
63227F						PERSONNEL, TRAINING, AND SIMULATION TECHNOLOGY
2743	AFHRL	3.991	4.430	6		AIRCREW COMBAT MISSION ENHANCEMENT (ACME)
	TOTAL:	3.991	4.431	(SIMULATION AND TRAINING DEVICES IN PE)		
TOTAL FUNDING IN PROGRAM ELEMENT 63227F :						
THE PRESIDENT'S BUDGET, JANUARY 1990						

(CONTINUED)

(CONTINUATION)

IV-A-12 : LISTING OF AF IN SIMULATION AND TRAINING DEVICES

PE/PROJECT	PERFORMING ORGANIZ.	FY90 (\$M)	FY91 CONG (\$M)	CAT	GOAL	PE/PROJECT TITLES
64227F						FLIGHT SIMULATOR DEVELOPMENT
2325	TS SPO	2.846	3.500	6		SIMULATOR DEVELOPMENT ACTIVITIES
2769	TS SPO	6.850	1.550	6		SIMULATOR UPDATE DEVELOPMENT/SIMULATOR REQUIREMENTS DEFINITION
2851	TS SPO	2.600	2.000	6		STANDARD DEPARTMENT OF DEFENSE (DOD) SIMULATOR DATA BASE/COMMON TRANSFORMATION PROGRAM
2901	TS SPO	3.000	3.370	6		B-1B WEAPON SYSTEM TRAINER (WST)
2968	TS SPO	1.510	1.000	6		MODULAR SIMULATOR DESIGN
2998	TS SPO	1.240	0.000	6		LOW ALTITUDE NAVIGATION AND TARGETING INFRARED SYSTEM FOR NIGHT (LANTIRN) SIMULATOR
TOTAL:		18.046	11.420	(SIMULATION AND TRAINING DEVICES IN PE)		

TOTAL FUNDING IN PROGRAM ELEMENT 64227F :

	FY90	FY91
THE PRESIDENT'S BUDGET, JANUARY 1990	58.186	41.220

## CONGRESSIONAL CATEGORY SYNOPSIS

CONGRESSIONAL CATEGORY: EDUCATION & TRAINING

DoD ORGANIZATION: DLA

CONTRIBUTING  
PROGRAM ELEMENTS: 64722S JOINT SERVICE TRAINING SYSTEMS

### SYNOPSIS:

The work within this joint-Service program focuses on improving training, performance and readiness of the active and reserve components.

The efforts within this program will include prototype development of new training technologies and joint-Service training data systems that improve training effectiveness and enhance the performance of the military forces. This work will identify successful single-Service efforts that can be employed on a multi-Service/DoD-wide basis for improvement of military operations and training.

The projects within this program will rapidly prototype, test, and evaluate innovative training technologies with high payoff and increased effectiveness for multi-Service implementation and potential transition to private and public sectors. The training and performance data systems will support Service requirements to improve performance measures and the effectiveness and efficiency of military training.

IV-A-13 : LISTING OF DLA IN EDUCATION AND TRAINING

64722S					JOINT SERVICE TRAINING SYSTEMS
0001	FM&P	2.780	5.390	6F	JOINT SERVICE MANPOWER AND TRAINING SYSTEMS DEVELOPMENT
0002	TPDC	2.220	4.299	6E	JOINT SERVICE TRAINING AND PERFORMANCE DATA SYSTEMS

TOTAL: 5.001 9.689 (EDUCATION AND TRAINING IN PE)

TOTAL FUNDING IN PROGRAM ELEMENT 64722S :	FY90	FY91
	-----	-----
THE PRESIDENT'S BUDGET, JANUARY 1990	5.000	9.689

APPENDIX A  
CONGRESSIONAL CATEGORIES  
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ET EDUCATION AND TRAINING  
-----

ET1 -- Education and Training (6.1)  
ET2 -- Curriculum Development  
ET3 -- Methods and Media  
ET4 -- Management Systems  
ET5 -- Effectiveness Evaluation  
ET6 -- Technology Transfer  
ET7 -- Special Applications

HF HUMAN FACTORS  
-----

HF1 -- Human Factors (6.i)  
HF2 -- Human Related Studies  
HF3 -- Human-Machine Related Studies  
HF4 -- Human-Machine-Mission Related Studies

MP MANPOWER AND PERSONNEL  
-----

MP1 -- Manpower and Personnel (6.1)  
MP2 -- Occupational Requirements and Structures  
MP3 -- Resources Management  
MP4 -- Recruitment, Accession and Placement  
MP5 -- Career Development  
MP6 -- Productivity and Effectiveness  
MP7 -- Civilian and Military Workforce Development

ST SIMULATION AND TRAINING DEVICES  
-----

ST1 -- Visual Simulation Technology (6.1)  
ST2 -- Force/Motion Cue Simulation Technology  
ST3 -- Sensor Simulation Technology  
ST4 -- Instructional Features  
ST5 -- Maintenance Training Simulation  
ST6 -- Weapons Fire Simulation  
ST7 -- Specialized Training Devices



# APPENDIX B

## PROJECTS TO BE COMPLETED IN FY90 (BY SERVICE)

PE	PROJ	FY90(\$M)	TITLE
-----			
NAVY			
64715N	S1140	0.972	TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW) MODIFICATION
		-----	
		0.972	TOTAL FOR NAVY
AIR FORCE			
64227F	2998	1.240	LOW ALTITUDE NAVIGATION AND TARGETING INFRARED SYSTEM FOR NIGHT (LANTIRN) SIMULATOR
		-----	
		1.240	TOTAL FOR AIR FORCE

PROJECTS TO BE COMPLETED IN FY90  
(BY CONGRESSIONAL CATEGORY)

PE	PROJ	FY90(\$M)	TITLE
-----			
SIMULATION AND TRAINING DEVICES			
-----			
NAVY	64715N S1140	0.972	TACTICAL ADVANCED COMBAT DIRECTION ELECTRONIC WARFARE (TACDEW)
AF	64227F 2998	1.240	MODIFICATION LOW ALTITUDE NAVIGATION AND TARGETING INFRARED SYSTEM FOR NIGHT (LANTIRN) SIMULATOR
		-----	
		2.212	TOTAL FOR SIMULATION AND TRAINING DEVICES

# APPENDIX C

## PROJECTS TO BE INITIATED IN FY91 (BY SERVICE)

PE	PROJ	FY91(\$M)	TITLE
-----			
ARMY			
----			
64715A	D574	11.500	COMBINED ARMS TACTICAL TRAINER
		-----	
		11.500	TOTAL FOR ARMY

PROJECTS TO BE INITIATED IN FY91  
(BY CONGRESSIONAL CATEGORY)

PE	PROJ	FY91(\$M)	TITLE
-----			
SIMULATION AND TRAINING DEVICES			
-----			
ARMY	D574	11.500	COMBINED ARMS TACTICAL TRAINER
		11.500	TOTAL FOR SIMULATION AND TRAINING DEVICES

## APPENDIX D

### RELEVANT POLICY-LEVEL MEMORANDA

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17 AUG 1978	Manpower and Logistics Concerns for New Major Systems
No Date	Increased Emphasis on Training and Personnel Systems Technologies
23 JAN 1979	Establishment of DoD Technology Advisory/Coordination Groups
10 OCT 1979	Application of Emerging Training and Personnel Systems Technologies
19 OCT 1979	Coordination of People-Related R&D
30 OCT 1979	Simulation and Training Devices Technology
26 NOV 1979	Increasing Demands for Personnel and Training R&D
11 DEC 1979	Navy Manpower, Personnel and Training Research, Development and Studies Program (MPT RD&S)
29 JAN 1981	Effectiveness of U.S. Forces Can Be Increased Through Improved Weapon System Design
12 FEB 1981	The Research and Development Information System (RDIS)
26 AUG 1981	Contractor Incentives to Improve Reliability and Support
18 DEC 1981	Guidelines For Assessing Whether Human Factors Were Considered In The Weapon Systems Acquisition Process
02 MAR 1982	Personal Microprocessor-Based Job Aids
25 FEB 1983	Defense Science Board (DSB) Summer Study on Training and Training Technology
11 JUL 1984	Memorandum of Agreement: Defense Training Data and Analysis Center (TDAC)
05 OCT 1984	Training Simulator and Device Guidelines
03 JUN 1986	Defense Training Data and Analysis Center (TDAC) Review
01 MAR 1988	Letter of Agreement; Defense Training Performance Data Center (TPDC) and Army, Navy, Air Force under Office of the Secretary of Defense control